

The Apple
Macintosh Emerges

FEBRUARY 1984

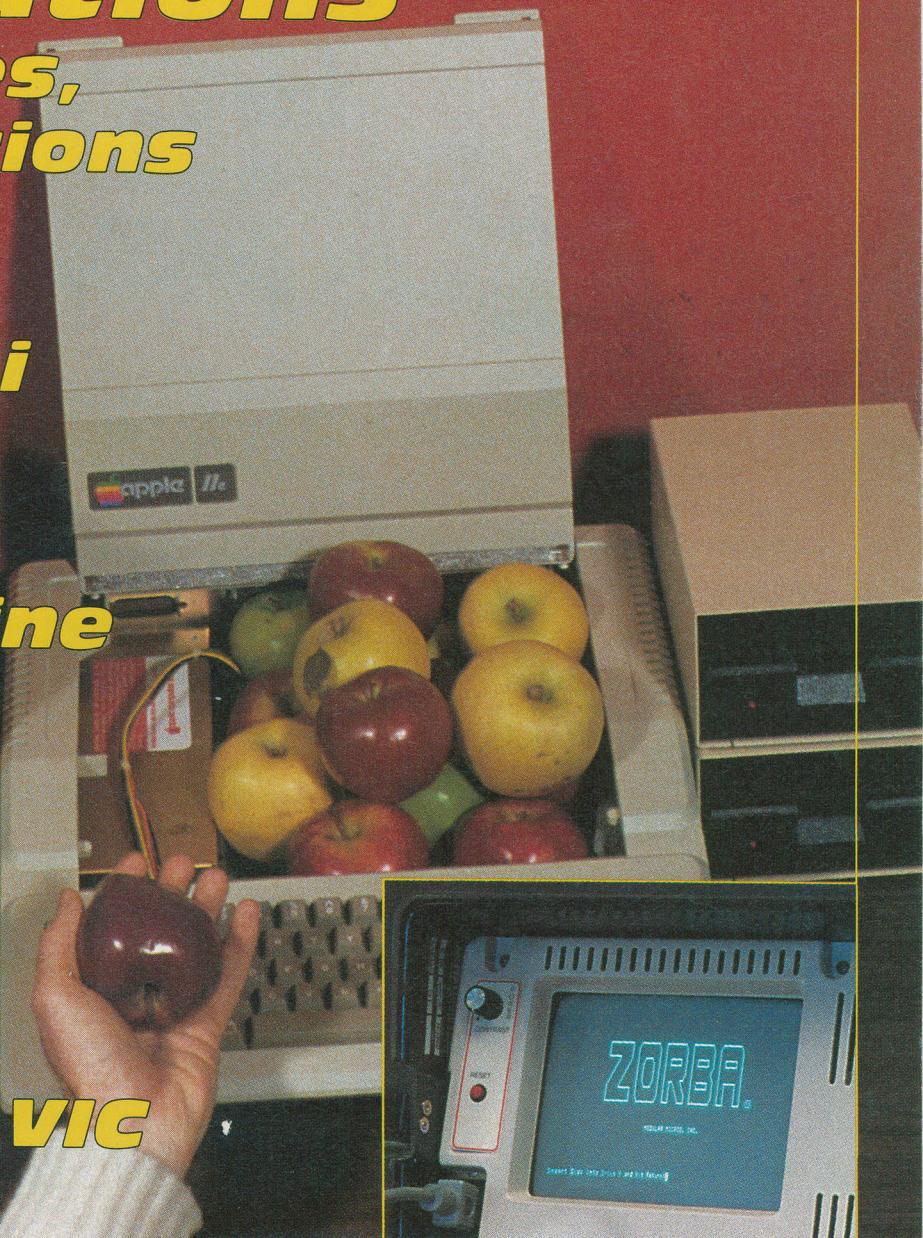
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- **Survey of Monitors**
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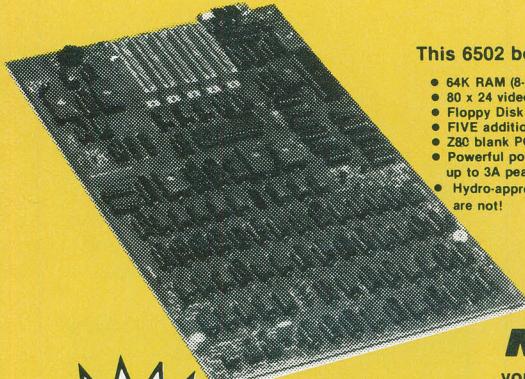
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February 1984

canada's Personal Computing Magazine

9 Apple Arcade

If all the Apple game software disks were stacked up one on top of another they would undoubtedly fall over. The inutterable vastness of the library begs observations like this. We herein have a look at some of the more popular volumes.

14 Survey of Monitors

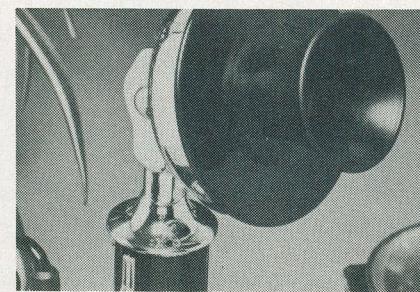
There are monitors of all types ... white ones, green ones, amber ones, composite ones, RGB ones, high res, low res, no res and monitors that have been dropped from 727s over the 401 and bounced off Mack trucks. A sorting is obviously in order.

20 A BBS In Your Business

You don't have to be selling computers to find a bulletin board system useful ... computer heads do buy other things. You can get one line with relatively little hardware ... the only tricky bit is making the best use of your time and the potential of your system.

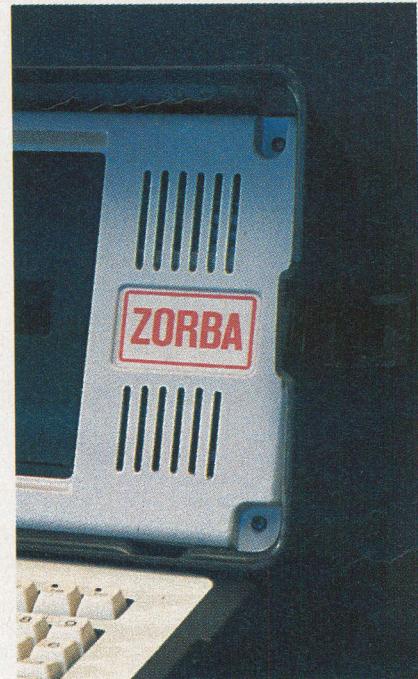
24 DOSDIAL

A few months back we did a dialing terminal for CP/M based Apples and it was such a trip that we have now done one that runs under DOS. It's quite a lot easier to get up and has considerably more power than the original CP/M code.



30 The Zorba

Even sillier sounding than the redoubtably foolish Emaxiotron Quasicomp IV, the legendary Fizzbatt 80 and the otherwise neat Pied Piper all rolled into one, the Zorba is none the less a supreme computer.



34 Machine Language on the IBM

The 8088 is a really tricky little processor ... and programming it, and the IBM PC that is frequently found around it ... takes some doing. Check out the rudiments.

38 ORGANIZE Your Apple

The keyboard on the average fruit lacks sharps, and does not lend itself to playing chords. If you would like to overcome this, you will need a second keyboard for your system. This one is available from many organ suppliers.

42

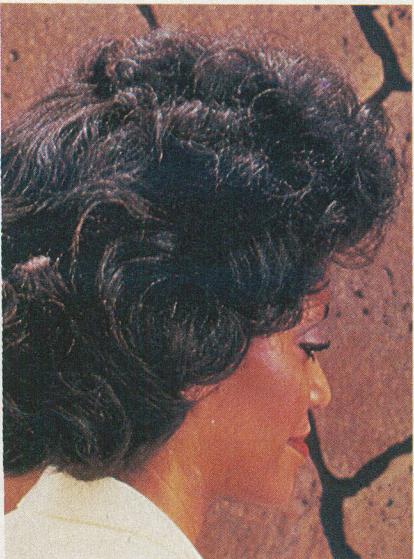
The Gemini Within

The Gemini 10 printer and its near relations have all sorts of hidden features which are very useful but also very tedious to get at in practice. Here's a simple menu driven utility to make them a little more tractible.

44

The Electronic Office Returns

Making your office high tech, with terminals spewing out of every virtual desktop icon, is not just a matter of buying some hardware and a lot of power bars. Remember, humans have to use them. Humans ... the hairy coffee makers you see around sometimes.



52

The Macintosh Revealed

The Apple Macintosh has been described as everything from a Lisa in a fruit crate to a pocket calculator that can't be understood by anyone. Well, we actually got to see one.

54

Polish That Buffer

The CP/M console command processor buffer is just a hundred and twenty seven bytes of undifferentiated nothing until you do something with it. However, then it becomes ... magic.

60

RAM Your Vic

If you have three kilobytes of useful memory on your VIC 20 another few K will probably seem like a gift from the gods. This article shows you how to do it up for less than the cost of a box of data cassettes.

64

Business Graphics Packages

If you need charts, graphs and other forms of visual presentations from your computer, you probably need a business graphics package. There are lots of them ... here's a look at the pick of the crop.

70

The Morse Fruit

You can use your system to handle Morse code. Dits and dahs will spew forth from your ports in all manner and shapes. Soon you'll be able to sell your TV and spend your evenings with huge steel headphones on your dome. What a blast.

74

Passing Parameters In Microsoft BASIC

You can overcome a number of the limitations of BASIC by using machine language to handle certain functions. Getting the routines to do what you want, however, is a bit tricky ... here's a look at how it all works.

Due to considerations of space, module three of Stockboy has been held until next month.

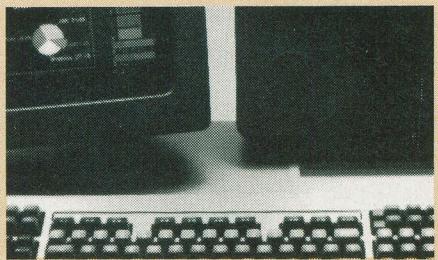
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Next Month in Computing Now!

Radio Teletype For Mortals

The "Byte of ShortWave" article we ran a few months back in the October issue of Computing Now! got a lot of souls interested in receiving news and other teletype transmissions on their systems. However, the code given therein was a bit hard to implement for some computers. Next month we'll be looking at a smoother deal.



Terminals

If you are contemplating a multi-user system, you will no doubt have heard all about terminals, and this feature will be useless to you. However, if you are still a bit perplexed about things like escape sequences, terminal emulators, serial links and cursor control, check out this feature next time around.

MENU

Operating systems are not really user friendly ... hostile is probably a better summation. If you are applying your computer to business situations or just want to avoid typing a lot of program names, you may find MENU to be useful. It almost makes your system ... human engineered.

A Few Of Our Favourite Things

If you're considering buying a computer and can even now feel the black waters of consumer panic swirling about your feet, hold onto your wallet for a few weeks. We'll be presenting a selection of what we think are ideal systems for business applications, personal computing, hacking, playing games and a number of other areas of micro-computer news.

Music on a Commodore

There are great sound chips in these little computers, but they can be a bit hard to work with. You have to POKE some bytes half senseless just to get noise, and actual music requires a lot of figuring and calculations and other brain destroying activities. Next month we'll look at some of the tricks.

Dialog

When I bought the CP/M based system we use to do office work on they told me that any CP/M based software would run on it right out of the box. However, I keep finding things that make me think this isn't true. Like, for instance, I bought Supercalc for the system a few weeks back and when I tried to boot the disk the system just hung.

Well, to begin with, when you buy software it invariably comes on a non-bootable disk. This is because you are buying the software, not the CP/M operating system... which you presumably already have.

So how do I use the disk I bought?

There are two ways. The preferred one is to make up a blank disk with a copy of your system tracks on it... usually by FORMATting and then SYSGENning a new disk... and then copy all the files from your software disk onto it. If you have the new blank disk in drive A you'll be able to boot your system and then put the master disk in drive B.

The other way is to SYSGEN your software disk.

Okay... another thing. A guy I know has a system and he brought over his copy of Wordstar for me to try. I could run the program and it sort of worked but the screen didn't seem to be right. There were bits of lines everywhere and every time I got to the bottom of the screen and the page scrolled up a line there would be random garbage characters in my text. But when we took the disk back to his place it worked fine.

There is a small group of CP/M based programs which aren't completely transportable. Wordstar and Supercalc are two of these... MODEM7, the file transfer package, is another, for somewhat different reasons.

In the case of the business packages, both of them use fairly complex screen displays. Because of the general speed required to make their screens look like they aren't being updated every time you think and because of the cursor positioning involved, these things have to use some of the inherent characteristics of the specific computers or terminals they run on.

Most computers do have particular control codes to do things like homing the cursor, deleting a character, positioning the cursor and so forth... but these are by no means standard. Thus, Wordstar, for example, has to know which sequences to use on the computer it's running on. This is handled by a program called INSTALL, which is run before you use the package.

What about disks? I've been given disks that are supposed to have programs on them and they'll fit into my machine fine but when I go to DIR them or get the files off the computer says BDOS error or just ignores them altogether.

Disk formats are a major pain. If you have a disk from, say, a CP/M based Apple and you plug it into an Osborne you will get air for your trouble. The programs on the disks are all compatible with your CP/M based system but the arrangement of the information on the disk itself is not right for your particular machine.

In fact, there are countless possible permutations of formats for five and a quarter inch disks. We have a system which was designed to read and write lots of the common formats and it



recognizes over thirty five of them... there are probably at least this many that are unreadable by anything other than their own systems, too. Unless you have a machine which can handle multiple formats, you'll probably have no luck trying to read disks not intended for your particular system.

Okay, so I have to get the right program for my computer and the right disk for my drives... I've also heard that there are different CP/Ms around. I've heard of CP/M 1.4, CP/M 2.2, CP/M 80, CP/M 86, CP/M 3.0, CP/M 68 and a few others. Are these all compatible?

You have quite a hash of operating systems there. Let's sort them out.

The normal CP/M which is used on 8080 and Z80 based computers is properly referred to as CP/M 80, the 80 referring to the processor it's written for. The original version of this, called CP/M version 1.4, was a bit crude and lacked a number of important features. It was superseded by CP/M 2.2, which is what is in use today for the most part. CP/M 3.0 is an enhanced CP/M which supports other features for really huge Z80 based computers, but, since newer processors have been developed which can outdo the Z80 for larger computers, it hasn't really been accepted the way one might have expected. The 2.2 version is pretty well the standard.

CP/M 80 cannot run on the 8088 processor found in the IBM PC and its emulators, so the creators of CP/M wrote CP/M 86, which is an operating system that acts much like CP/M on the PC. However, little of the CP/M 80 software library will be of much use on it.

As new systems come out, new versions of CP/M are written for them... hence things like CP/M 68 and so on. While these things act like CP/M, so one need not learn a whole mass of new commands, they can't use existing CP/M 80 software.



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IBM PC Compatible a new defacto standard

The importance of IBM's entry into the microcomputer market place is now being realized. The reality and ubiquity of IBM's presence is further reinforced by the research results which were recently released by Future Computing Inc. According to the findings of this U.S.-based market research firm, PC compatibility will be the winning strategy because of the growing PC compatible software base and the PC compatible peripheral development. In fact, there are over 1500 companies developing software and almost 500 firms manufacturing peripherals for the IBM PC and PC compatibles.

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RAM memory	128K	128K
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Portable PPC-1 measures 9.6" H x 18.8" W x 19.8" L and weighs 28 lbs.

According to *Future Computing Inc.*, there are four categories of IBM PC compatibility: (a) operationally compatible, (b) functionally compatible, (c) data compatible, and (d) MS-DOS compatible. These are listed in descending order with operationally compatible being the highest category. On the basis of its study *Future Computing Inc.* concluded that the CORONA PC belongs to the operationally compatible category and the CORONA PC is the best kind of PC compatible in this category. The CORONA PC meets all the requirements of PC compatibility. The CORONA

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- : runs IBM PC-DOS and CP/M 86
- : runs IBM non-graphic software
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- : uses interpretive and IBM-compiled Basic with graphics
- : uses disk media
- : has an identical keyboard

With these kinds of attributes to assure software and hardware compatibility with the IBM PC defacto

standard, the buyer of a CORONA PC is assured of future flexibility. Hardware compatibility along with software compatibility keeps the user's future open. The CORONA PC is demonstrably a superior micro at a significantly lower price. The CORONA is a PC COMPATIBLE with no hidden costs. Everything is built-in on the motherboard: parallel port, serial port, video port, four expansion slots, sockets for memory expansion to 512K on the mother board, and a socket for the 8087 co-processor. In addition, it comes with software: MS-DOS, PC Tutor, GW Basic, and MultiMate, a word processor.

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ters today. Add the word "portable" and an almost unlimited market potential for Integrators and Computer retail dealers alike presents itself. The CORONA PORTABLE is electronically identical to the desk-top version introduced some six months ago; same high-res graphics, same power supply and mother board capabilities. The difference: a 9" built-in screen in place of the regular 12" on the desk top. Plus — it looks good!

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Bulletin Board

Noting public interest in Lisa's input peripheral, *Apple Computer* has announced a **mouse** for the Apple II line of computers. Supporting MousePaint software will also be available...

TRS-80 Model MC-10 owners can access such online services as Dow Jones or CompuServe with **Micro Color Compac**, a terminal program from *Radio Shack*. A modem is required as well...

Arctic Data Corporation is offering a Canadian **payroll system** for CP/M computers. The password secured system employs menu driven operation for ease of use...

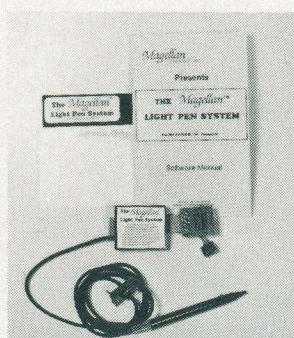


Kaypro, Xerox and Zorba users desiring IBM PC compatibility can use the **Co-Power-88** board from SWP. Marketed by *Comptron*, the 8088 board is available in up to two hundred and fifty-six K configurations...

Microsoft Windows, a form of window mapping similar to that being used in Apple's Lisa, are now available for users of *Data General* Model 10 computers. The product will work on all MS-DOS based software...

A sixteen bit upgrade for TRS Models I, III and 4 is available from *Micro Projects*. **MicroMERLIN** users may choose from CP/M-86 or MS-DOS to complement its one hundred and twenty-eight K RAM offering...

ZX-81 users with sixteen kilobytes of RAM, a Timex/Sinclair printer and a desire to write will benefit from **Word Sinc II**, a word processor from *P. Hargrave*. The program offers lower case, expanded print, and special characters...



A new **light pen** for the Apple computer is being produced by *Magellan Computer Incorporated*. The system includes two software packages, and plugs into the joystick port...

A summarised compilation of over three thousand, six hundred software packages has been published by *Computing Publications*. The **directory** is fully indexed and lists over one thousand suppliers...



A computer aided design system is now being offered by *Accugraph Corporation*. The **ACCU/CAD** system may be used in engineering applications, with operator training provided...

Busy executives can learn to use Multiplan with a four tape voice cassette tutorial from *FlipTrack Learning Systems*. **How to Use Multiplan** may be used with any cassette player...

TNW Corporation is offering a low cost three hundred baud auto-dial, auto-answer modem. The **Operator 103** utilises large scale integration chips and one letter operating commands...

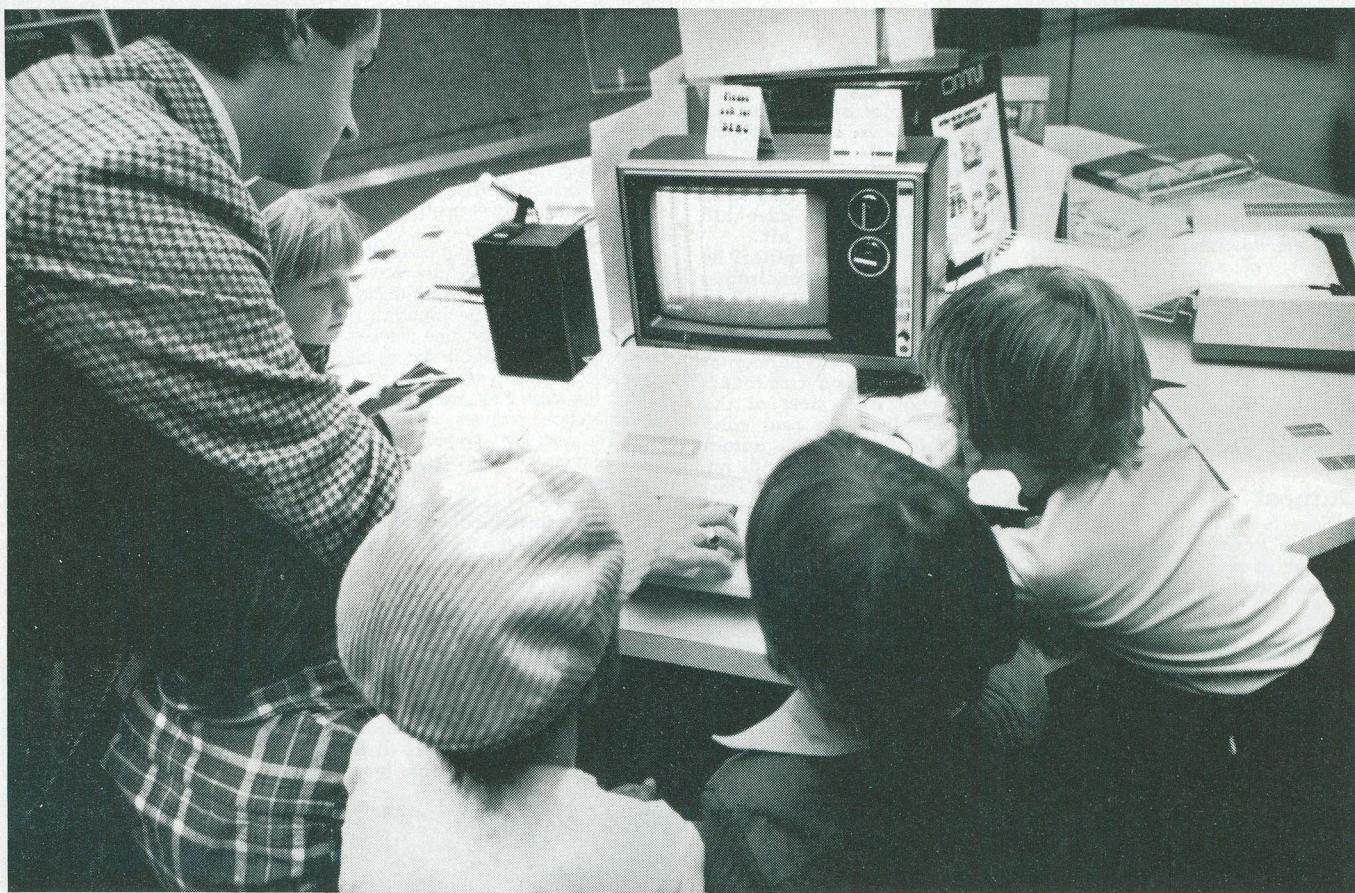
The Canadian **flag** on last month's cover was supplied by the *Annin Flag Company* of Toronto...

David Brillert of Richmond Hill, Ontario was the lucky winner of the Commodore **monitor** draw at the *Computing Now!* booth at the recent *World of Commodore* show. David was randomly selected from over twenty seven hundred entries...



Addresses: Apple Canada Inc., 33 Yonge Street, Suite 1120, Toronto, Ontario M5E 1S9 • *Radio Shack*, Tandy Electronics Limited, 279 Bayview Drive, Barrie, Ontario L4M 4W5 • *FlipTrack Learning Systems*, 999 Main, Suite 200, Glen Ellyn, Illinois 60137 • *Comptron*, 10641 - 123 Street, Edmonton, Alberta T5N 1P3 • *Data General Canada Inc.*, 2155 Leanne Boulevard, Mississauga, Ontario L5K 2K8 • *P. Hargrave*, Site V, RR#4, Nanaimo, B.C. V9R 5X9 • *Accugraph Corporation*, Courtyard, 112 Merton Street, Toronto, Ontario M4S 2Z8 • *Micro Projects Engineering, Inc.*, 10810 W. Washington Blvd., Culver City, California 90230 • *TNW Corporation*, 3444 Hancock Street, San Diego, California 92110 • *Computing Publications Inc.*, 101 College Road East, Princeton, New Jersey 08540 • *Magellan Computer Inc.*, 4371 East 82nd Street, Suite D, Indianapolis, Indiana 46250 • *Arctic Data Corporation*, 1839 1st Avenue, Prince George, British Columbia V2L 2Y8 • *Annin Flag Company, Limited*, 15 Brandon Avenue, Toronto, Ontario M6H 2C8

Apple Arcade



There are a lot of video games out there... and some of them are evil. They want to grab your money and give you only slightly more excitement than a foot bath. Here's a look at some of the more common denizens of the little wire racks and what they are really like.

by Brian Greiner
and John Rudzinski

There are zillions of games available for the Apple II computer, but most of them are copies or near copies of a few original ideas. There are games that are strictly hand eye coordination

types, there are some that require strategy and there are some that are strictly strategy games. The quality of the graphics varies as well, from gawd awful to excellent.

How, then, is one to choose? At fifty dollars or so per game, a loser can be an expensive investment. They don't let you return them just 'cause they're dull.

Well, thanks to the folks at Gentek Computers in Downsview, Ontario I was able to try out a number of popular games. What follows is a totally subjective opinion of these games, but hopefully it will be of use to anyone looking for action on the four colour tube. I learned that behind a well designed package can lurk a poorly designed game. I also learned that I enjoy blasting monsters, demons, wizards, aliens, and other threats to our way of life.

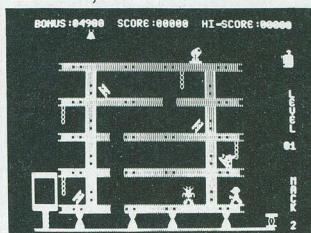
Most of these games are also available for other computers, such as the Commodore 64, the Radio Shack Colour Computer and so on.

Be warned... I have not been to sleep in over a week, and some of the RAM in my Apple is glowing cherry red. These games can be addictive!

Hard Hat Mack

by Electronic Arts

The object of this game is to help a construction worker, name of Mack, complete his construction projects despite the interference of a vandal, OSHA and falling objects. It is a sort of snakes and ladders game, with Mack climbing up ladders and elevators to avoid the nasties and finish the job.



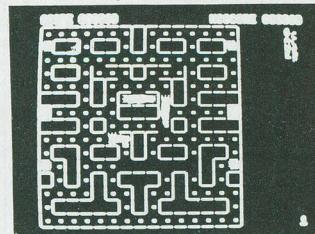
The graphics are very good and the sound effects, while simple, are effective. It is not an overly complex sort of game, but has enough action and levels of difficulty to appeal to a broad range of ages.

I liked it. It's silly but fun.

Maze Craze Construction Set

by DataTrek

This is a Pac Man style package that allows the user to either design the maze, the shapes used and the type of control used... you get a choice of paddles, joystick or the keyboard... or play one of the available games on the disk.



While it may be interesting at first to draw both the hero and its adversaries, the game you create will always resemble a Pac Man maze, no matter how many nooks and crannies you build into the walls.

It's a bit extreme, and is recommended for Pac Man freaks only.

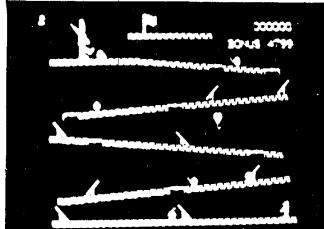
Cannonball Blitz

by On Line Systems

The entire workings of the game seems to be having a sentry kick

Apple Arcade

cannonballs down a series of inclines, with the object being to



dodge the balls and get to the sentry.

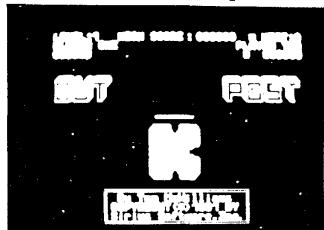
The animation in this 'Donkey Kong' take off seems stiff, though it would have been very high tech in 1978.

After great deliberation over this work... seemingly endless minutes... I can say that it's very dull. Don't waste your money on it.

Outpost

by Sirius Software

Imagine yourself as the commander of a stationary space station with control of your force shields and minimal phasers being attacked by ships that randomly appear in one of several fixed positions.



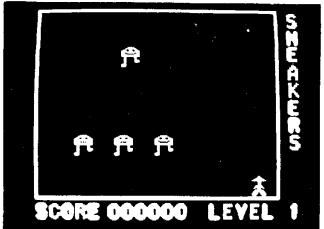
Imagine using the keyboard for control. Imagine playing this turkey for longer than ten seconds.

Difficult, isn't it...

Sneakers

by Sirius Software

This is essentially a Space Invaders style game, with all sorts of silly figures attacking you. The storyline is the de facto standard of the spaceship at the bottom of the screen saving the universe from huge menacing shapes.



After destroying waves of sneaked creatures, cycloids, H-wing fighters and 'fangs, you have the pleasure of being pelted by innumerable meteoroids.

Perhaps very young children might get a kick out of it, but it is a very dull game in comparison with

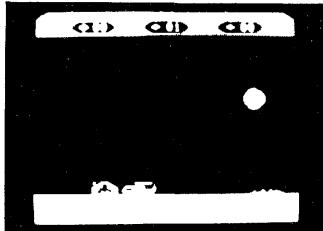
some of the software currently available.

Choplifter

by Broderbund Software

The object of this game is to fly your helicopter into enemy territory to rescue hostages. The forces of evil... probably all Liberals... will try to stop you with tanks, jet aircraft, and satellites. They will also kill any hostage they can hit.

Sound vaguely familiar? Be careful... it makes you into a Marine. Well, despite the aura of *deja vu*, I liked this game. The helicopter seems to handle like I would expect a helicopter to. That is, there is a trick to it. It has inertia, and most of the characteristics of a real solid object moving through actual air. It does not respond immediately to the controls, just as an actual aircraft does not.



The game has a twist not usually inherent in such works... you only get points for rescuing hostages. Blasting a tank or jet into dog food only rids you of its presence, the score remains unchanged.

Another interesting point occurs upon successful completion of your mission. The game ends! Apparently, it's felt that you've had enough of playing the hero when you've picked up sixty-four waving prisoners.

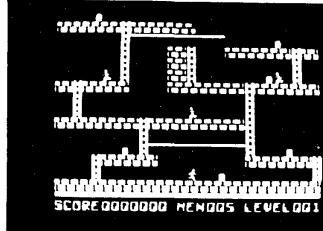
There is not really any strategy involved with this game. It is all hand eye coordination.

Choplifter is not a great game, but it's good, and at least offers fair value for its price.

Loderunner

by Broderbund Software

This game is going to become a classic, I think. It involves strategy, hand eye coordination and concentration. There is lots of action as the hero tries to pick up treasure while being pursued by Nasties (I like to think of them as agents for the Infer-



nal Revenue Service) through a maze.

The maze consists of a stone framework, ladders and ropes. The maze becomes more complex, and the nasties become faster and more numerous as each maze is solved. I was very proud of myself for reaching level six until I overheard a proud father boasting that his young daughter (who looked all of eight or so) had reached level one hundred and seventy one.

At least it took her a couple of hours of concentrated effort.

One minor, though irritating, feature that should be brought to light is the amount of time it takes between screens. Upon successful completion of a screen, it clears by turning the maze into a circle whose circumference reduces slowly to zero. The next level begins with an expanding circle that eventually fills the screen.

If you are going to buy a fruit, you should not consider your life complete without this game.

Sea Fox

by Broderbund Software

As the commander of an attack submarine, your mission is to sink as many enemy ships as possible. The obstacles include mines, depth charges and enemy subs... not to mention running out of fuel and torpedoes. The nasties get nastier the better you get.



The enemy ships are often accompanied by hospital ships, which, by the miracle of bit mapped graphics, have hulls which are resistant to your torpedoes. Ammunition fired at these bounces back to you and becomes a major annoyance as the screen fills with ships.

Extra fuel is carried on the backs of trained dolphins released by a friendly sub. Blowing away a dolphin by mistake is rewarded by a lethal nudge from a large fish.

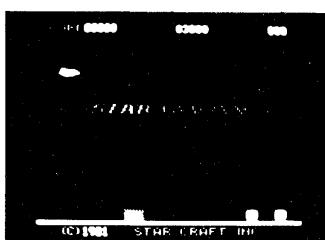
As time wasters go, it's better than Dallas.

Star Blazer

by Starcraft Incorporated

In this shoot em up game, you are the pilot of an aircraft doing low level attacks on different targets. Of course, there are all sorts of obstacles, some of which shoot back. The graphics are fair, but not great.

Various screens await completion, where you do various missions from blasting ICBMs, planes, tanks,



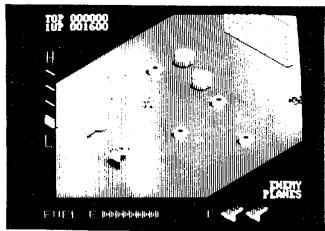
tanks loaded with smart missiles and the like. Fuel is parachuted from the top of the screen from an allied aircraft, and is usually dislodged by other crafts flying the friendly skies.

This is also better than Dallas, but only if you've already seen all the episodes.

Zaxxon

by Sega Enterprises

Zaxxon is, of course, the classic mayhem arcade game. It features superb graphics and no need for bothersome strategy... just hand-eye coordination. A friend of mine who spent many hours... and dollars... in the arcades playing this game found this version to be very much like the arcade game.



The underlying theme behind this three dimensional graphic feast is to blow Zaxxon, a robot, to tiny pieces as often as necessary. As Zaxxon resides on the second platform, it is necessary to navigate through rockets and small openings, blowing up enough tanks of fuel to keep going. Dogfights in space follow.

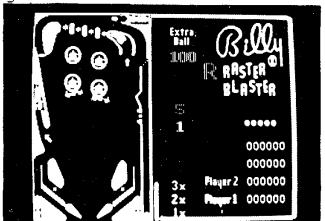
Subsequent levels offer electrified wall openings that the player's ship has to fly through, smaller openings, and Zaxxon himself, holding the missile that will either spell your doom or his, depending on your aim.

I like it.

Raster Blaster

by BudgeCo

This was the first pinball simulation game to hit the market. At the time



of release, it was hailed as a fantastic game, and sold innumerable copies. Another contender, David's Midnight Magic, followed with better graphics and playability.

Raster Blaster is somewhat inferior when a comparison is made between the two programs. Not only is the layout devoid of challenge or even interest, but the software is not very good. I have had a ball pass right through a paddle!

If you've been to the cheaper pinball parlors around your home town, where the proprietor jacks up the legs on the games just before he opens the business, you'll have an idea how it plays. The ball moves erratically and seems to have a vested interest in dropping to the bottom of the screen.

Bill Budge's latest offering, Pinball Construction Set, allows users to create their own games with similar features.

Tilt!

Zork I, II and III

by Infocom

This series of games are not really arcade games. They are strictly text... no graphics at all, except in your imagination. I started playing a version of these on a DEC PDP-11 minicomputer, and got hooked.

The authors broke the original game into three portions to make it fit into an Apple. As far as I can tell, these three games contain the entire

```
YOU ARE IN A DARK AND DAMP CELLAR WITH A NARROW PASSAGE LEADING NORTH AND A HOLE IN THE BOTTOM OF A STEEP METAL RAMPS WHICH YOUR SHARD IS GLOWING WITH A FAINT BLUE GLOW.

IN THE TROLL ROOM IS A ROOM WITH PASSAGES TO THE EAST AND SOUTH AND A FORESTING HOLE LEADING WEST. PERHAPS, AND USE MAR THE HALLS. A HARRY LOOKING TROLL GUARDS OUT OF THE ROOM. YOUR SHARD HAS BEGUN TO GLOW VERY BRIGHTLY.
```

original game... called Dungeon... plus some extra stuff.

You are an adventurer exploring the caves beneath a mansion in search of treasure

You can expect to encounter thieves, demons, unicorns, trolls and other exotic critters.

and excitement. Everybody else may think you're a used yak salesman, but, have faith, it's a delusion. You can expect to encounter thieves, demons, unicorns, trolls and other exotic critters. The place has riddles, logic puzzles, small and large mazes and scenery as rich as

your brain can make it. Zork is highly addictive despite its verbosity and can totally absorb you for hours on end. The maze is highly complex and requires that anyone without a photographic memory draw a map.

I rate these as an absolute essential package, despite their total lack of graphics. They are among the best of their genre, and I highly recommend that you try at least one.

—Brian Greiner

I dislike video games, with their constant buzzing, beeping, flashing and zapping. I hated them when I nightly frequented the arcades, and now I hate them at home, sitting smugly on their disks, waiting for their owner to boot them up and get frustrated.

I loathe them so much I've lost count of how many I have. Between two computers, I've snapped the arms off three joysticks. It's becoming an expensive hatred.

When the Apple II computer made its debut, its ROM listings were laid out for all to see. Further annotated listings were made available for a price, and software authors went wild. After they figured out Wozniak's unique HiRes architecture, the games started to trickle out.

Some of the games reviewed both so far and below are old... ancient relics of an earlier age... decaying even... some are three years old.

Every few months, a new game comes out that others emulate, instead of emulating the arcade offerings. Games six months old are considered tame, yielding space on shelves to newer offerings.

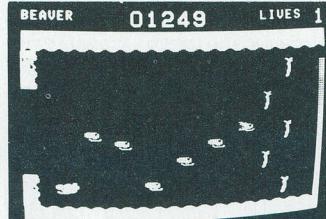
Read these reviews before the disks are locked away in dusty archives, valuable antiques of months long past. Hurry!

Evolution

by Sidney Dataproducts

Written by two British Columbian teenagers, Evolution consists of six screens of increasing difficulty. As you finish a screen, your character goes up the evolutionary ladder.

You begin as an amoeba, eating DNA while dodging persistent microbes. The next



screen has you as a legged tadpole, catching...uh, waterflies. Nasty fish keep you from doing this at any great speed. Follow-

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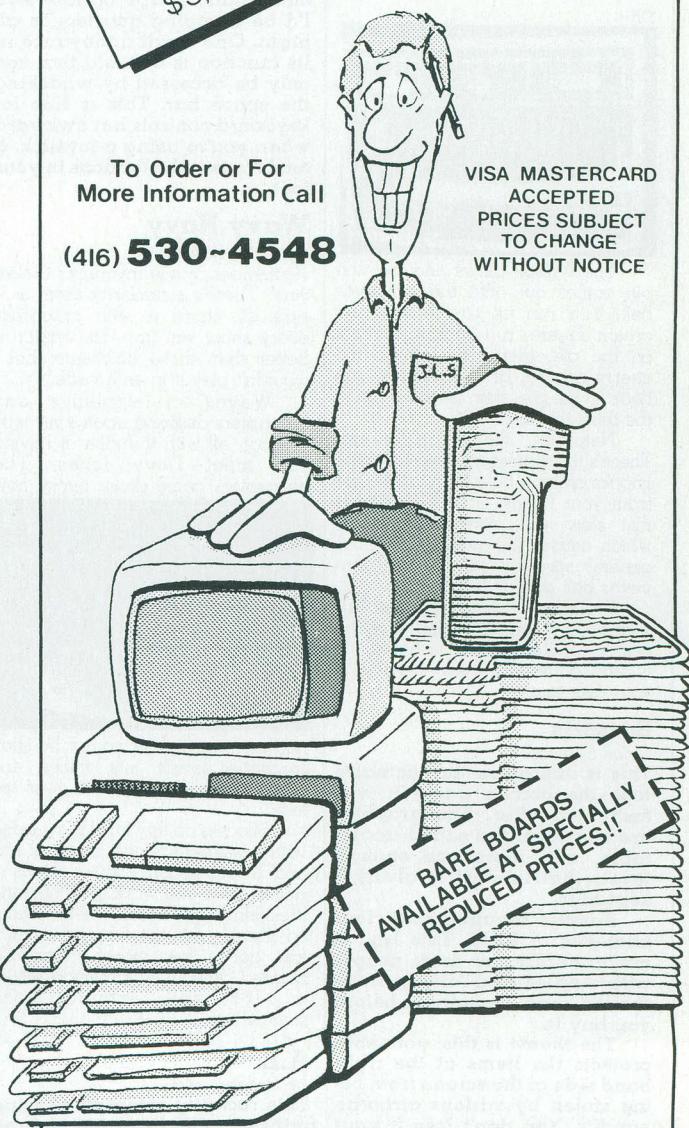
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Apple Arcade

ing this, you've become a mouse, avoiding snakes and eating cheese.

You do a lot of eating in this game.

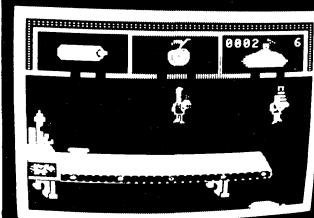
The remaining three screens are of a beaver dodging alligators, an ape beaning monkeys with oranges, and a human running away from mutants.

Though it doesn't lend itself to credibility, and is often infuriatingly difficult, I've found it to be an excellent way to bend my joystick.

Pie Man

by Penguin Software

This is a silly game. You've gotten yourself a job as an apprentice baker in an assembly line pie factory. You're working with a bumbling fool who usually waits until a crucial moment before he bumbles you.



The whistle blows and the first pie comes out onto the conveyor belt. You run up to the whipped cream square, run back to spritz it on the pie, then totter up to the cherry square, grab a cherry, run back to the pie, then take the pie to the third square.

Naturally, things go wrong. There's the aforementioned fool who knocks cream and cherry or the pie from your hands, spilled flour bags that slow you down and water, which causes the inevitable slip. A general speeding up of the conveyor belt doesn't help, either.

Promotions abound, notes like 'Good Work' and 'Not Bad' give the player confidence. In all, though silly, the game deserves a place in your disk files.

Bandits

by Sirius Software

This is one game that actually tops the arcade game it was fashioned after. The graphics are supreme, the sound acceptable, and there are enough levels that interest is always kept high.

Bandits requires sixty four kilobytes of RAM. This isn't a major hurdle, as most people with Apples and clones have the 16K card. Be warned before you buy it.

The theme is this: your ship protects the items at the right hand side of the screen from being stolen by various airborne bandits. You don't lose if your entire inventory has been

pilfered, but you don't get any bonus points, either. Your inventory is anything from fruit to TV sets and beyond. The thieves are a nasty lot, simple fly like creatures, things resembling centipedes that drop molten liquids and unusual aliens comprised of small spheres that like to bounce on you.



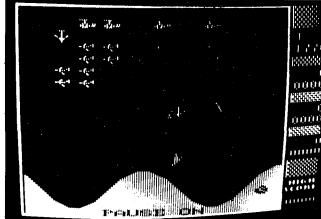
Personally, this is the only game of the lot that I'd consider a true 'arcade' game. If my clone had an appropriate slot, I'd be dropping quarters in all night. One small annoyance in its function is a shield that can only be accessed by whacking the space bar. This is fine for keyboard controls but awkward when you're using a joystick. It tends to tear the tendons in your foot.

Wavy Navy

by Sirius Software

Remember Space Invaders? Galaxians? There's a similarity here, as, I suppose, there is with practically every shoot 'em up. This version is better than those dinosaurs, but I wouldn't play it in an arcade.

Waves of airplanes and helicopters descend upon your little tugboat, all with the idea of having you meet Davy Jones. The helicopters come down every now



and then to shoot at you or be shot. In higher levels, jets, mines, and missiles strive to amputate your sea legs.

Success on any level is awarded with a seafaring song of some sort and a promotion. You start as a galley slave and work toward being President. I got bored when I attained Deckhand...the second level... and got a few more promotions before I called it a night and shelved it. It's still around here somewhere...

A.E.

by Broderbund

This recently released offering utilizes a different kind of three dimensional graphics. The mov-

ing menaces weave around and behind background objects, to an attractive effect.

A.E. is airborne stingrays that travel in strings. Your mission? You guessed it, though it does follow a plot of sorts. As you blast away a screen of A.E.s, you've effectively pushed them further away from earth. The final screen is the Milky Way galaxy, with various planets populating the previous screens.



There are a number of innovative features sported in A.E. A proper shot at a string of stingrays is aimed and detonated just before the A.E.s run into it. Detonation occurs when you release the joystick button. You need to destroy three entire strings of the monsters before you can advance a screen. If you let too many escape, the single strings of six become double strings of three, then triple strings of two, and finally a wave of six independent A.E.s.

Trust me. It's easier to get a Rolls Royce on credit than to blast a ten second wave of six single stingrays.

An added feature may surprise you. You can actually get real music to emanate from your one and a half inch speaker... fugues... one for each screen. Mercifully, you can turn the sound off after you've recovered.

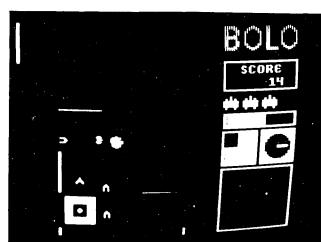
In all, A.E. is a satisfying game.

Bolo

by Synergistic Software

Bolo is a tank maze game, offering an overhead view of the action on the screen. On booting, you may choose your controls and the level you feel comfortable with, and then get to the meat of the matter.

After a short pause to generate the maze, you find your tank running into walls. The controls are sensitive, and a bit of practice has you



navigating them properly.

A number of concrete enemy bases plague the maze, and it's up to you to find them (through a crude directional "hint" square), and to blast them from your sight. As these things are never all that easy, some obstacles present themselves.

Simple drone tanks usually get in your way. Smarter tanks take pot-shots at you. Some follow you no matter where you go, and their aim is admirable.

Explosions, attained either from hitting the core of an enemy base or another tank, are dangerous and should be avoided. Being engulfed by a drone tank's explosion on your last tank is depressing, at very least.

The maze scrolls by quickly, especially when the player elects to move sideways. It's a gigantic maze, and losing a tank usually results in your being placed in a different quadrant... bad news if you were unleashing a barrage at a base when you got hit.

As a nonstop action game, this rivals the best, and may even be worth its price.

Repton

by Sirius Software

Repton is one of the Defender lookalikes that were fashionable for a time, though your ship doesn't rescue any visible humans in this version.

When you first begin your journey, the skies rapidly fill with aliens of all sorts of depictions. There are two major sorts to be looking out for on the first level, the Drayns, who drain your energy, and some clawed creatures who dismantle the buildings on the ground to build up their base.



The alien base grows while the dismantlers destroy buildings. Flying over the base is rewarded with a volley of ground to air missiles, and, should the base be completed, you are faced with an underground fight with gleeful aliens.

In all, it's an attractive game, and if you liked Defender in the arcades, you'll likely enjoy Repton.

—John Rudzinski

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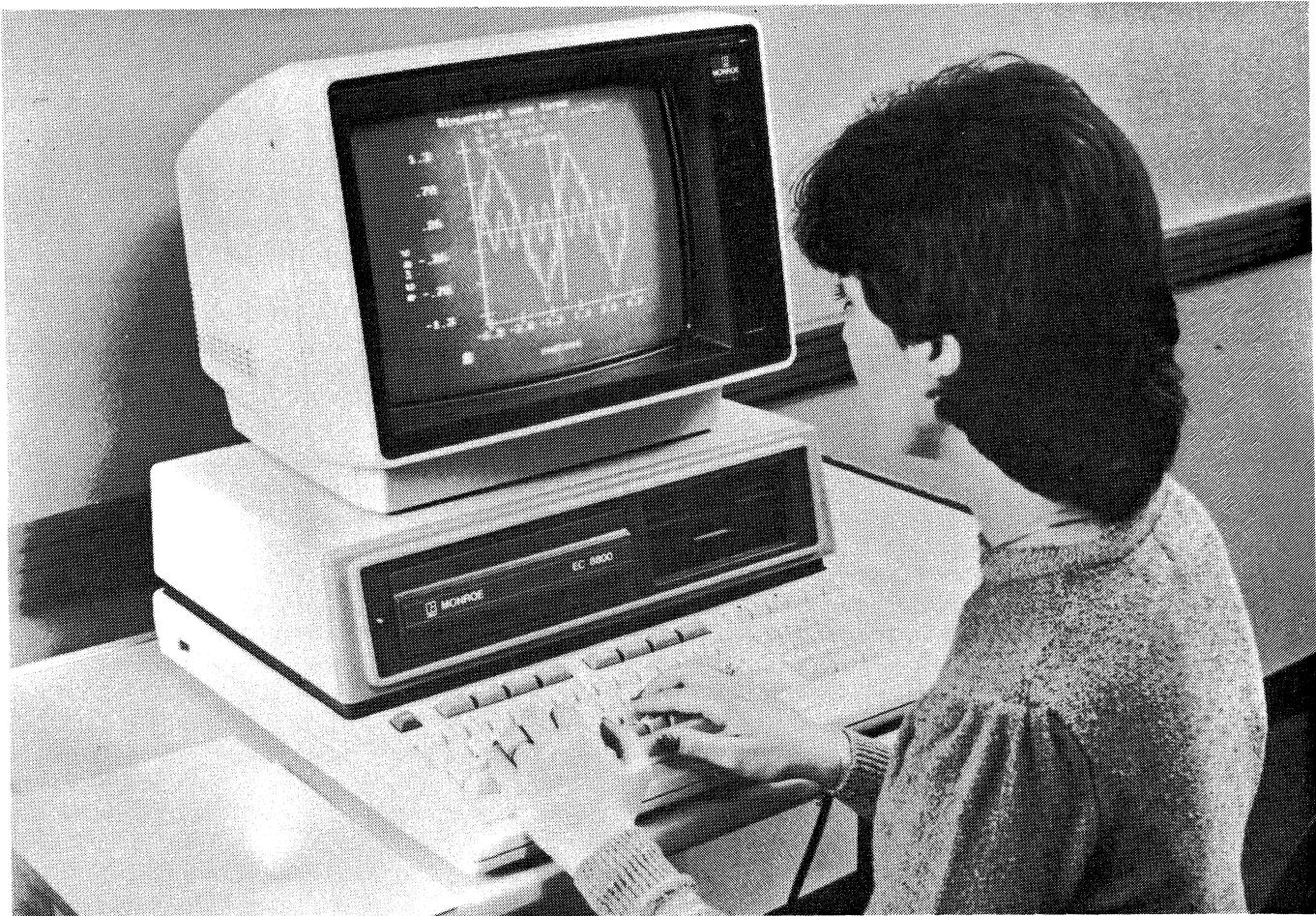
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Survey of Monitors



If you've been programming and watching *M*A*S*H* with the same device ... at the same time ... you'll probably want a monitor. Here's a look at what's available.

Every computer has a monitor of some sort, be it integrated like the PET and Radio Shack models or an entirely separate entity. Some users utilise their television sets for this purpose, often to the anguish of other family members. Though this is an inexpensive way ... not including alimony and child support ... of seeing what you're typing, it does have drawbacks.

A television set screen displays broad lines and computer generated pixels looked blurred, lacking the crispness usually inherent in a monitor. An eighty column output, comprised of characters usually no more than three pixels wide, isn't legible on a television. Colours blur into an amalgamated mosaic on a colour TV, but are sharply defined on a proper monitor.

Produced in innumerable shapes, sizes and screen colours, monitors fall under strict federal guidelines in Canada, much stricter than in the States. After the Canadian Standards Association permits its CSA

sticker on their chassis, Health and Welfare Canada test for unacceptable radiation levels and other potentially lethal hazards. Failure to pass any test usually ensures a long trip back over the border or across the ocean.

As the monitor is the visual window to what's going on in the computer, it is often mistaken for the computer itself. It's not a rare sight at all to see a seasoned programmer bawling out his greenscreen.

Finding the best monitor for your use will take some investigation on your part. Users of computers that generate coloured characters may benefit from a colour monitor over a monochrome model, whereas the extra cash outlay for colour may be unjustified for the business user. Often, it's a matter of personal taste. Some feel that an amber screened monitor is easier on the eyes than a black and white or green display, where others disagree.

Colour monitors come in two flavors.

The less expensive kind accepts composite input, and provides reasonably high line resolution. The RGB models, however, utilise red, green and blue 'guns' that provide for much higher resolution, an infinite variety of colours, and an overall more pleasing display.

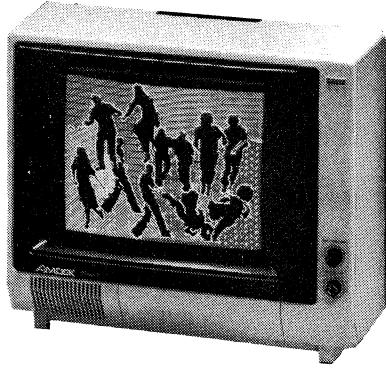
There may be hidden costs that insist on accompanying your monitor purchase. Some computers, like the Apple II, cannot directly be interfaced to an RGB monitor, and a separate card must be purchased. Often, a monitor can only be interfaced with a limited number of computers, and may not like yours in the least. Interface cables don't always come with the purchase, and are not always readily available.

This survey looks at what is waiting to perch atop your machine and stare at you. Please note that the prices quoted below are the manufacturers' suggested list prices, and may be considerably higher than what the retailers actually are charging.



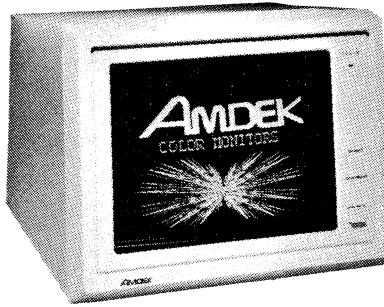
Amdek Video 300/300A

Type: 300-Green phosphor / 300A-Amber phosphor
Screen size: 12 inches
Bandwidth: 18 megaHertz
Display capability: 80 X 24
Compatible with: IBM-PC, Apple II/III, Atari, TRS-80, Osborne
Interface incl: For Apple II
Special: Non-glare screen
Available from: Exceltronix, Supertronix
Price: 300-\$260.00 / 300A-\$295.00
Other:



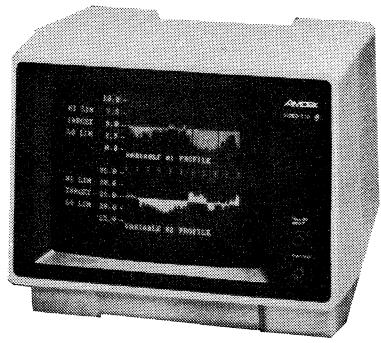
Amdek Color I

Type: Colour, composite video
Screen size: 13 inches
Bandwidth: 260 X 300 lines
Display capability: 40 X 24 characters
Compatible with: IBM-PC, Apple II, Atari, Commodore, TI 99/4A
Interface incl: N
Special: Built-in speaker
Available from: Exceltronix, Supertronix
Price: \$525.00
Other:



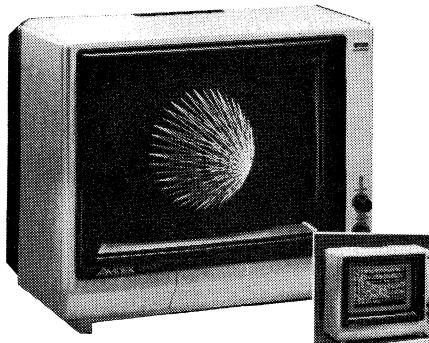
Amdek Color IV

Type: Special HiRes inline
Screen size: 13 inches
Bandwidth: 720 X 420 lines
Display capability: 96 X 24 characters
Compatible with: NEC PC-8001
Interface incl: N
Special: RGB analog input
Available from: Personal Computer Institute
Price: \$1495.00
Other: RS 170A signal level compatible



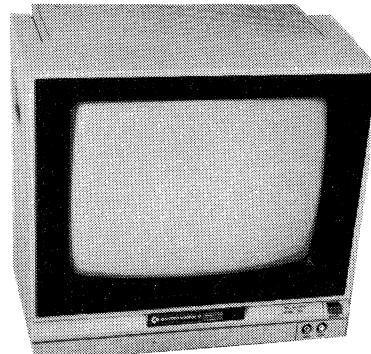
Amdek Video 310/310A

Type: 310-Green phosphor / 310A-Amber phosphor
Screen size: 12 inches
Bandwidth: 18 megaHertz
Display capability: 80 X 24
Compatible with: IBM-PC
Interface incl: Y
Special: Non-glare screen
Available from: Personal Computer Institute
Price: 310-\$350.00 / 310A-\$360.00
Other: TTL inputs



Amdek Color II+

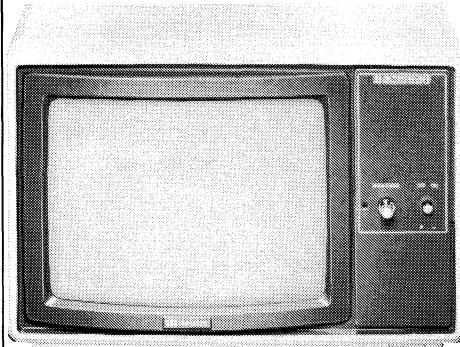
Type: RGB colour
Screen size: 13 inches
Bandwidth: 560 X 240 lines
Display capability: 80 X 24 characters
Compatible with: IBM-PC, Apple II, Apple III
Interface incl: For IBM
Special: RGB video input
Available from: Personal Computer Institute
Price: \$995.00
Other: Card required for Apple II



Commodore Model 1702

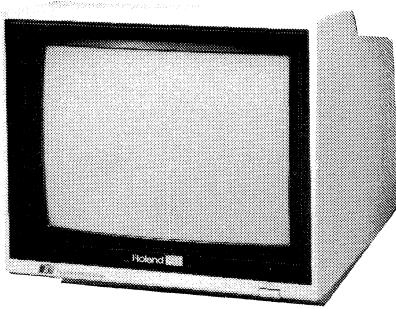
Type: Special colour composite input
Screen size: 12 inches
Bandwidth: N/A
Display capability: 40 X 25 characters
Compatible with: Commodore VIC-20, Commodore 64
Interface incl: Y
Special: High resolution colour
Available from: Richvale Telecommunications
Price: \$449.00
Other: Audio input

Survey of Monitors



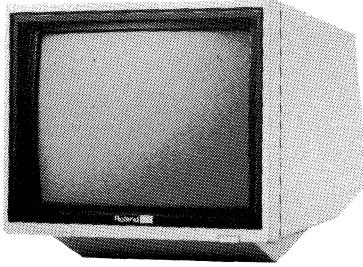
Electrohome ECM 1302-2

Type: RGB colour
Screen size: 13 inches
Bandwidth: N/A
Display capability: 80 X 24 characters
Compatible with: Apple //, others
Interface incl: N
Special: RGB inputs
Available from: Local dealers
Price: N/A
Other: Will accept composite input with optional NTSC interface



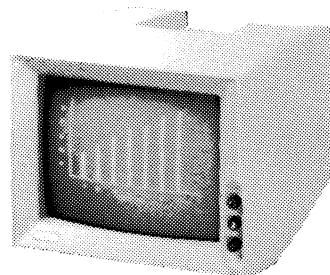
Roland DG CC-141

Type: RGB input
Screen size: 14 inches
Bandwidth: 18 megaHertz
Display capability: 80 X 25
Compatible with: IBM-PC, Apple II
Interface incl: N
Special: Non-glare CRT
Available from: Personal Computer Institute
Price: \$895.00
Other: Apple II needs interface card



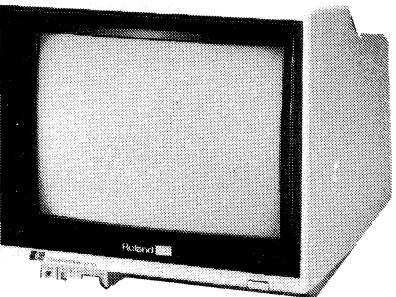
Roland MB121G/MB121A

Type: MB121G-Green phosphor / MB121A-Amber phosphor
Screen size: 12 inches
Bandwidth: 18 megaHertz
Display capability: 80 X 25
Compatible with: Apple II, //e, others
Interface incl: N
Special: Non-glare CRT
Available from: Personal Computer Institute
Price: 121G-\$250.00 / 121A-\$275.00
Other:



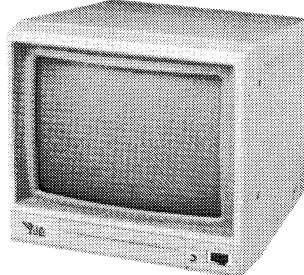
Mitac TM-1265

Type: Composite input green phosphor
Screen size: 12 inches
Bandwidth: 18 megaHertz
Display capability: 80 X 24
Compatible with: Apple II, others
Interface incl: N
Special: Non-glare green phosphor CRT
Available from: Computerway Inc.
Price: \$220.00
Other:



Roland DG CB-141

Type: Composite input, colour
Screen size: 14 inches
Bandwidth: 270 lines horizontal
Display capability: 40 X 25
Compatible with: Apple II, others
Interface incl: N
Special: Built-in speaker
Available from: Surplustronics, Orion
Price: \$525.00
Other:



Yanjen GM-1201

Type: Amber composite video
Screen size: 12 inches
Bandwidth: Up to 20 megaHertz
Display capability: 80 X 25 characters
Compatible with: Apple II, others
Interface incl: N
Special: Non-glare amber CRT
Available from: General Electronics
Price: \$189.00
Other:

SOFTWARE

Jan. Feb.
Specials!

SOURCE ID: STU345
COMPUSERV ID: 71046, 1017

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List \$2736

Runs on IBM PC with 256K and a hard disk.

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List \$575

Runs CP/M 8" and IBM PC.

Peach Text 5000

\$406

List \$545

Runs MS DOS with 128K.

dBase II

\$555

List \$780

Runs Apple II with CP/M, CP/M 8", DEC Rainbow, IBM PC, TI PRO, and Osborne.

Multiplan

\$275

List \$370

Runs Apple II with CP/M, CP/M 8", and IBM PC.

Wordstar

\$455

List \$610

Runs Apple II with CP/M, CP/M 8", DEC Rainbow, IBM PC, and TI PRO.

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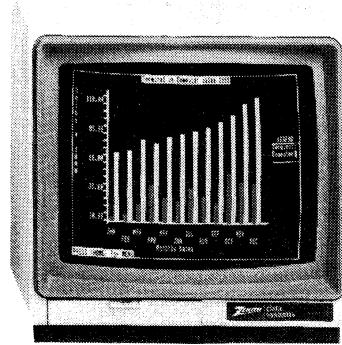
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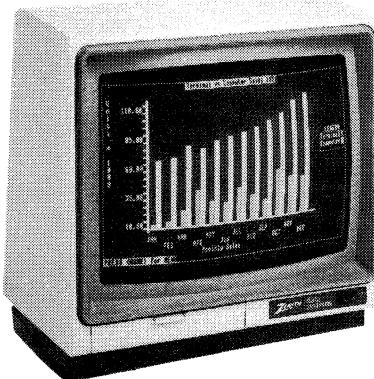
Circle No. 15 on Reader Service Card.

Survey of Monitors



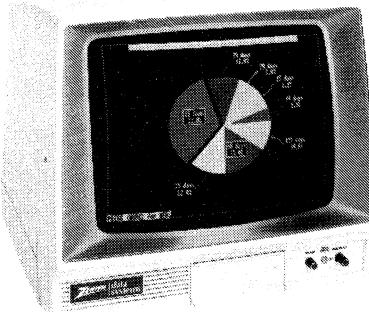
Zenith ZVM 122

Type: Amber composite video
Screen size: 12 inches
Bandwidth: 15 megaHertz
Display capability: 80 X 25
Compatible with: Apple II, III, IBM-PC, Commodore, TI 99/4A
Interface incl: N
Special: 40 to 80 column switch
Available from: Exceltronix
Price: \$225.00
Other:



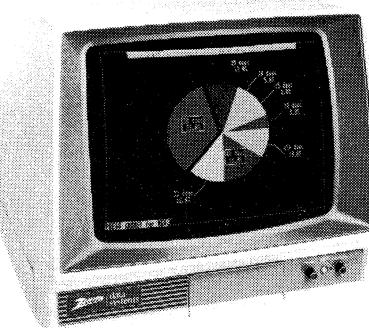
Zenith ZVM 123

Type: Green phosphor composite video
Screen size: 12 inches
Bandwidth: 15 megaHertz
Display capability: 80 X 25
Compatible with: Apple II, III, IBM-PC, Commodore, TI 99/4A
Interface incl: N
Special: 40 to 80 column switch
Available from: Exceltronix, Supertronix, Audiovision
Price: \$225.00
Other:



Zenith ZVM 131

Type: RGB/composite colour
Screen size: 13 inches
Bandwidth: 2.5 megaHertz composite
Display capability: 40 X 25 characters
Compatible with: Apple II, III, IBM-PC, Commodore, TI 99/4A
Interface incl: N
Special: Outside light sensor, built-in speaker
Available from: Audiovision
Price: \$575.00
Other: Composite and analog RGB inputs



Zenith ZVM 135

Type: HiRes RGB/composite colour
Screen size: 13 inches
Bandwidth: 20 megaHertz RGB / 3 megaHertz composite
Display capability: 80 X 25 RGB / 40 X 25 composite
Compatible with: Zenith Z-100, Apple II, III, IBM-PC, Commodore, Atari, TI 99/4A
Interface incl: N
Special: Outside light sensor, adjustable speaker
Available from: Local dealers
Price: \$1000.00
Other: Composite and analog RGB inputs

Addresses:

Exceltronix, 319 College Street, Toronto, Ontario M5T 1S2 (416) 921-8941 • Supertronix, 279 College Street, Toronto, Ontario M5T 1S2 (416) 927-1921 • Personal Computer Institute, 70 Yorkville Avenue, Toronto, Ontario (416) 964-0724 • Richvale Telecommunications, 10610 Bayview Avenue, Richmond Hill, Ontario (416) 884-4165 • Computerway, Inc., 31 Progress Ct., Unit 6, Scarborough, Ontario M1G 3V5 (416) 439-9804 • Surplustronics, 310 College Street, Toronto, Ontario M5T 1S3 (416) 925-8603 • Orion Electronics, 40 Lancaster Street West, Kitchener, Ontario N2H 4S9 (519) 576-9902 • General Electronics, 5233 Yonge Street, Willowdale, Ontario M2N 5P8 (416) 221-6174 • Audiovision, 578 Marlee Avenue, Toronto, Ontario M6B 3J5 (416) 781-3263

CN1

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"More than that, J.T. Radio Shack adds the personal touch to business computers."

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Radio Shack's most advanced generation of desktop business computers takes on an exciting, new dimension.

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From number-crunching efficiency to multi-user capabilities, Model 16B meets the demands of today's business. You can put the magic of "16B" to work for less than

you imagine. Model 16B, with built-in hard disk, is only \$9,399.00.

Support at Radio Shack includes: the widest choice of microcomputers and software; qualified staff to help you select your system; full time educators in Computer Centre classrooms; On-Site service available in every major Canadian city.

That's total support at Radio Shack, the world's most personal computer company.

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shack®**
COMPUTERS THAT MEAN BUSINESS

Consult the white pages for the Radio Shack Computer Centre, store or dealer nearest you.

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I'm interested. Send me more information today.

NAME	TITLE
COMPANY	TELEPHONE
ADDRESS	POSTAL CODE

ON
1984

Circle No. 3 on Reader Service Card.

A BBS In Your Business



Looking for a new application for your business computer? Tired of spreadsheets and form letter generators? You need a computer bulletin board system. You probably knew it was something like that.

by Steve Rimmer

There are a lot of ways to sell what you are doing. Newspaper ads work, but they're expensive... and if you are the least bit esoteric in what you have on your shingle the percentage of your audience which is reached by the Daily Planet may well be diminishingly minute. Radio and television spots are cheaper per inser-

tion, but the guys who sell this stuff will begin to talk about "saturation" shortly after you walk in the door.

Saturation advertising, like saturation bombing, means that you heave everything you have at whatever you want to get the attention of. One radio spot for fifty five dollars is nothing. A "package" of spots, otherwise referred to as a truckload sale, can be passing fearsome.

There is no magical way around these things. Advertising pays, but the wad of bills needed to prime its pump is pretty thick. One unusual form of advertising which has become popular of late, however, one which has relatively little cost attached to it, is the lofty computer bulletin board service.

Judging by the topic of this article, you may have gathered that we're now going to have a dig through this subject. Indeed.

When It's Dark and Cold

To begin with, it might be worth looking at

who is out there phoning up bulletin board systems. If your business does stuff that would appeal to them, read on. If you're into other things... well, there are always skywriting and wandering clown acts.

Having run a board for about two years now, we've been getting a pretty decent look at just who calls these things. It's not always easy to characterize who logs on, but you can pretty well figure out what the heads that leave the messages are into. Oddly enough, it's not as straightforward as one might think.

It's safe to say that everyone who calls a computer bulletin board has a computer. Two years ago, the people who were calling boards all had two thousand dollar and up systems and it was predictable that most of them were computer heads. This is no longer true... there are tens of thousands of VIC 20s and similar low end computers in this astral sphere now, all of which can be gotten "on line"... capable of calling

boards... for about a hundred dollars. As such, even souls who have just a casual interest in computers as an end call boards.

The computer has become a medium in its own right and an increasing number of users are getting to micros for that reason. They get computers to do things... art, writing, accounting, music, speculation, inventory and so on. Somewhere along the line many users find that telecommunications... bulletin boards... are a practical way to reach other people with the same applications.

Computer bulletin boards have, thus, been springing up to serve interest groups with interests far beyond the things that run the boards. In fact, many users of boards know little more about their computers than is needed to turn them on and connect them to their phones. They are up for other things.

The interest groups that call boards are varied. However, there are several useful generalizations which can be made of them. To begin with, there are an awful lot of kids on the boards, ranging from twelve to eighteen. There are also quite a few professional users... doctors, engineers and other such white collar humanity. There are a number of boards around that are set up entirely for them... you'll find medical boards, engineering boards and so on.

Finally, there is a growing class of users who are just common consumers. They call boards much as they might watch the tube. A BBS is a lot more interesting than television, and you can do a lot more with it, inasmuch as it reacts to you particularly. What you leave on it results in what you get back off it later on. This is fairly appealing when the alternative is tuning in a program which is shared by thirty million other people.

The Bottomless Pit

The best reason for setting up a bulletin board happens in the first thirty seconds after someone signs onto it. It's called a log on. This is a message which tells callers what they have called. If you are the proprietor of Maxwell's Track Shoe Bazaar, your board could say

Thanks for calling the
Maxwell's Track Shoe Bazaar BBS
operated by
Maxwell's Track Shoe Bazaar
1876 Yaksweat Boulevard
Footbreath, Ontario

Open 'til nine

and every time someone called it, they'd get to read your stuff. After the log on, you

could have a bulletin. This can talk about the weather, offer comments on the state of fungus farming in Mongolia or, should you feel up to it, shout about your weekly specials or the five hundred Oldsmobile radios you have for sale.

Now, this may seem like a bit of a cheat... someone calls your board and gets blasted with ads. However... unless you overdo it... most users will realize that they are getting to use your system for free, and won't get too grouchy over spending a few minutes looking at the commercials.

Everyone realizes that advertising is the price one pays for the medium that carries it. In the case of commercials on the tube, the price is obvious. In doing up a bulletin board this way, you are providing your users with a pretty good service in return for fairly little attention on their part... most heads will consider this to be a decent trade.

Depending upon what you are actually selling, you can expand on this to some extent. There are a number of things that can be tacked onto the basic computer bulletin board concept, such as on line catalogs, order entry and a help service. These are probably worth looking at one at a time.

An on line catalog is the easiest thing to add to a straight up bulletin board. In most cases, it will be a menu driven tree structure deal to keep the reading time down to a manageable eternity... bear in mind that three hundred baud communication, the speed at which your board can send things to the great beyond, is very slow.

Returning to Maxwell's Track Shoe Bazaar, we find that old Max sells:

1. Sneakers
2. Joggers
3. Kodiak boots
4. Sweat socks
5. Oldsmobile radios

This is properly called a menu. If someone selects the on line order function of Max's board, they'd see this. Supposing one were to select item five, one might then see

1. 1949 Olds AM with busted speaker	\$.37
2. 1959 Olds AM with no knobs	\$ 1.41
3. 1967 Olds AM/FM no tubes	\$ 2.56
4. 1968 Olds AM/FM with tubes	\$ 12.95
5. 1975 Olds AM/FM 8 track (1 tape)	\$ 20.00

and so on. In most cases, it's realistically practical to have three or four steering pages, in which one narrows down the categories one is interested in, before actually hitting the price lists. Most menu driven catalog deals have extra functions, such as characters to hit to skip ahead a page, to quit printing a page and to jump back to the top of the menu.

The obvious extension to this is an order entry function. If you do mail order stuff, or deliveries, you can let people order things over your board. Having been given the opportunity to browse through your catalog and check out your specials and whatnot, here's the ideal situation to talk them into actually putting their Visa numbers on the line.

Putting daily specials on a bulletin board looks really good because boards are so immediate. With a bit of finesse, you can make them hourly if you want to.



A BBS In Your Business

One of the great things about a bulletin board is that a lot of people call boards at three in the morning... when they're up for nearly anything.

A help service is more in keeping with a board that's set up for professional services. Like boards themselves, this is beneficial to both you and the rest of humanity if you run it right. A decent example is the growing number of legal boards that have been brought on line. On these things, one gets to ask technical questions of the law firm what owns the board. The lawyers will answer the ones that can be done in a thousand characters or less, which is fair enough. Anything else draws a note that the thing is too complicated for a yes or no answer... and would you like to come by Tuesday at two.

Run With It

Okay... you have all your toys in one room, the modem's hooked up and the screen says "waiting for carrier". The only thing you now need is callers. Fortunately, these are the easiest part of running a board.

Unless your board is absolutely abysmal, you can look forward to a constantly busy phone whenever the system is on line. If you are determined enough to watch the board 'til daybreak you'll probably find that many nights the action keeps up right until you pull the thing down to open up your shop for regular human traffic.

There's only one practical way to publicize the existence of your system. Simply call up a few other boards in your area and leave messages on them announcing yourself. If you aren't sure of what's up, consult the BBS number list in the December 1983 issue of CN!.

When we first set up the Bull, our own board, we left a single message on another local system and went through over thirty callers in the first night. In most areas the number of potential callers far exceeds the availability of boards, and a new system can expect to get lept on as soon as the packing foam is off its modem.

Running a board is fairly simple. You are the sysop...system operator... and everyone else gets to be users. The respon-

sibilities of the sysop lie in clearing up old or uncool messages... you also have to define "uncool" for your particular board... setting a general tone for your system and maintaining any services you have set up.

Probably the most difficult part in maintaining a BBS is keeping your own stuff... bulletins, ads and so forth... current, although even with this your sysoping time will probably come to less than a half hour a day.

A bulletin board is a great way to reach a pretty interesting group of people, and whether you set one up to advertise your stuff or just for general public relations, you will find that you will generate a lot of interest in your business with relatively little investment.

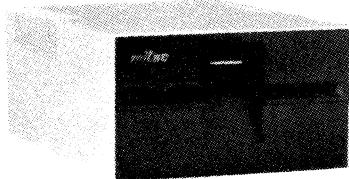
At the very least, a board is much cheaper than a package of television ads and you don't have to stand in front of a bank of killer flood lights and talk to cameras.

Remember... no matter what colour suit you wear to the taping, everyone looks like a carpet salesman on TV.

CN!

mitac

Apple II® Compatible Disk Drive

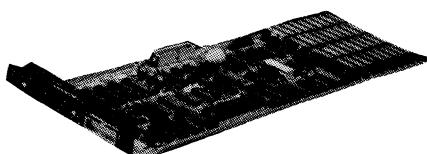


Mitac Mate-1

- One year warranty
- Shugart SA-390 Mechanism
- 143K, 35 tracks
- 100% fully Apple II® compatible
- Instant Installation
- Software Transparent

mitac

IBM PC™ Multifunction Expansion Board

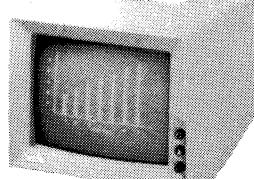


SD1-Enhanced

- One year warranty
- 64K — 256 K of RAM
- RS-232 Async Serial Port
- Printer/Parallel Port
- Clock/Calendar
- Game adapter
- Free Software Included
 - Softdisk
 - Spool

mitac

The Video Monitor Display with Elegance



Mitac TM-1265

- One year warranty
- Ergonomic Design
- 12" nonglare green screen
- High resolution, 800 lines horizontal, 18 MHz video bandwidth
- Controls - Zoom/Normal, contrast, brightness, on/off, input Impedance

Circle No. 20 on Reader Service Card.

Coast to coast warranty/service provided under contract with E.S.S.N.A. Services Ltd.

COMPUTERWAY INC. 31 Progress Ct. Unit 6, Scarborough, Ont. M1G 3V5

● Toronto (416) 439-9804 ● Montreal (514) 878-2803 ● Calgary (403) 265-4536 ● Vancouver (604) 273-1393

Dealer/OEM Inquiries Invited

MITAC IBM PC™ Compatible Available Soon!

An Important Announcement To Advertisers and Readers of Computing Now! and Electronics Today

The March issue of Computing Now! will feature the Annual Directory of Computer Stores in Canada while Electronics Today will carry the Annual Directory of Electronic Stores in Canada.

This 1984 update will not only supply name, address and telephone listings for a combined total of 1000 outlets but will inform readers and advertisers of the product line offered by each outlet and whether catalogues are available on request.

For advertisers, these issues offer a special opportunity to display their message to not only the thousands of regular readers of ETI and CN! from coast-to-coast but also the many additional readers and companies who purchase these special issues for permanent record and for distribution to staff. For readers, there is the opportunity to find out about the many new outlets that have surfaced since the 1983 update. The list has increased by almost 100%.

Additional copies of these issues will be available on a bulk copy basis and orders should be forwarded now to the Circulation Manager of each publication. For advertising space reservations contact should be made immediately with Omar Vogt or Rick May at (416) 423-3262. Time is of the essence to avoid disappointment.

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DOSDIAL



If the magnitude of your success in getting onto bulletin board systems of late has been comparable to that of a mongoose's left earlobe you probably need an autodialing terminal. Check this one out.

by Steve Rimmer

Computer bulletin board systems started off being pretty obscure but, as the hardware needed to access them became cheaper... a VIC 20 will do now... and the interest in them expanded it has become increasingly difficult to get onto boards. Even if you live in a city with several dozen of the things going you can spend several hours with nothing but busy signals to show for your worn and bleeding dialing finger.

There are, however, souls who do manage to get onto boards quite often... they have added an extra bit of paraphernalia to their systems. Recognizing that for any given board the line will have to be free sooner or later... if only for a few seconds... your really serious bulletin board head will be found with an autodialer plugging away at it.

An autodialer is a fairly sophisticated terminal package. It dials the phone for you, looks for a carrier and, finding none hangs up and tries again. You can leave an autodialer running all night if you want to... just make sure your system can beep loud enough to drag you out of a cursor-coma when the thing finally strikes life.

This program converts a regular sleazy Apple clone into an autodialing terminal. It also provides for a phone number library to permit one the height of laziness... you don't even have to punch in the phone numbers. It runs with a low cost PDA 232C serial card, although it's easily adapted to other suitable hardware.

COMplications

Many of the principles behind DOSDIAL are the same as were used in the CP/M dialing terminal a few months back. Phone dialing is actually fairly simple... all you have to do is to get the timing right.

The program starts by showing you a menu of its phone numbers. You can move the cursor up and down using the arrow keys... I know, they go right and left, but this is a minor conceptual hassle. A carriage return will select the number the cursor is pointing to. A "Q" will leave the program.

If you snatch a number from the menu the program really gets to have its fling. Like a man-eating sock mouse, it wrenches the phone from its hook... electrically, of course... and proceeds to dial the number for you. This involves raising and lowering the level of the phone line for very specific times, handled by the waiting loops in GOSUB 1380. Dialing "1" means raising and lowering it once. Doing a "2" means hitting it twice. A "0" means blasting it ten times... obviously, the phone system can't

tell the difference between nothing happening and zero pulses being dialed.

Once the program has had a good dial it proceeds to wait for a carrier. The PDA card has a register which signals the presence or absence of this fundamentally useful phenomenon. If it finds a carrier it boots you into a terminal program... we'll come to that. If it doesn't, it waits a while and heaves you back into the menu.

While the program is waiting, it can be interrupted by hitting a character on the keyboard. If you hit anything but an "A" you will go back to the menu. If, however, your questing digit strikes just a bit right of the control key the thing will take this as a sign from the almighty to autodial. When it is finished waiting it will do the number again, and keep doing it, until you hit another character during one of its waits... provided this one is something other than an "A".

Mellow Tones

If at some point the sound of a hundred partially drunk lemmings screaming as they are flung out of an airplane over South Dakota... to wit, a carrier... should impinge itself on your phone line, the program will pop itself into the terminal. The terminal program is written in machine code because BASIC is too slow to handle three hundred baud communications. It lives in the data statements at the end of the program and goes to work up in page one of the high resolution graphics memory... which isn't used for anything else in this package.

The terminal is a very simple thing. It is a long loop which alternately checks to see if there is a character waiting at either the modem port or the Apple's keyboard port. If it finds one at the modem port it stuffs it onto the screen. If it finds one spewing out of the keyboard it gets zapped at the modem.

In addition to this, it converts lower case characters to upper case for Apples that can't do lower case on their tubes, manages a flashing cursor and starts things off by sending an initial carriage return to the remote system when first called. It filters line feeds from the incoming data since the Apple cheerfully puts in some of its own.

Typing a control E while in the terminal mode will exit the terminal program and hand control back to BASIC, which will hang up the phone, tidy things up and return you to the menu for another call.

Pops and Scratches

There are two things you might want to alter in the terminal. In all cases, this involves NOPping out parts of the machine language code. A NOP is a 6502 instruction which

```

100 REM DOSDIAL
110 REM A DIALING TERMINAL
120 REM PROGRAM FOR THE PDA
130 REM APPLE II+ RUNNING
140 REM THE PDA SERIAL CARD
150 REM
160 REM COPYRIGHT 1983 (C)
170 REM STEVE RIMMER
180 REM
190 REM DEFINES
200 DIM N$(24)
210 N$(0) = "423-5149 CN! BULL"
220 N$(1) = "223-2625 TPU6"
230 N$(2) = "366-2069 CFTR"
240 N$(3) = "445-1725 TTC"
250 N$(4) = "624-5431 PSI"
260 N$(5) = "978-6893 MED-NET"
270 N$(6) = "667-6711 YORK U"
280 N$(7) =
290 N$(8) =
300 N$(9) =
310 NMAX = 0
320 IF N$(NMAX) < > "" THEN NMAX
   = NMAX + 1: GOTO 320
330 NMAX = NMAX - 1
340 SLOT = 2
350 BASE = 49287 + 16 * SLOT
360 DPRT = 49288 + 16 * SLOT
370 BAUD = 49289 + 16 * SLOT
380 LINE = 49291 + 16 * SLOT
390 MDM = 49292 + 16 * SLOT
400 LST = 49293 + 16 * SLOT
410 MST = 49294 + 16 * SLOT
420 D$ = CHR$(4)
430 DLO = 128
440 DHI = 1
450 CFW = 26
460 PRINT D$;"IN#"+ STR$(SLOT)
470 PRINT D$;"PR#0"
480 BEL$ = CHR$(7)+ CHR$(7)+ CHR$(7)
490 FOR X = B192 TO 8288: READ A:
   POKE X,A: NEXT X
500 GOSUB 570: REM PROTOCOL
510 GOSUB 650: REM DO MENU
520 GOSUB 880: REM DIAL NUMBER
530 GOSUB 1120: REM WAIT ON
   CARRIER
540 IF A < > 176 THEN GOTO 1720
550 GOSUB 1170: REM TERMINAL
560 GOTO 500
570 REM SET PROTOCOL
580 POKE LINE, PEEK (LINE) + 128
590 POKE DTA,DLO
600 POKE BAUD,DHI
610 POKE LINE, PEEK (LINE) - 128
620 POKE LINE,CFW
630 POKE MDM,3
640 RETURN
650 REM DO LIBRARY
660 AFLAG = 0
670 HOME : VTAB (3): HTAB (10)
680 INVERSE
690 PRINT "DOSDIAL TERMINAL"
700 HTAB (10)
710 PRINT " VERSION 2.21 "
720 NORMAL : PRINT
730 FOR X = 0 TO NMAX
740 HTAB (10)
750 PRINT N$(X)
760 NEXT X
770 P = 0: GOSUB 1250
780 GOSUB 1350
790 DP = P
800 IF A$ = CHR$(13) THEN
   GOTO 860
810 IF A$ = "Q" THEN GOTO 1830
820 IF A$ = CHR$(8) AND P > 0
   THEN P = P - 1
830 IF A$ = CHR$(21) AND P <
   NMAX THEN P = P + 1
840 GOSUB 1250
850 GOTO 780
860 VTAB (23): HTAB (10)
870 RETURN
880 REM DIAL THE NUMBER
890 VTAB (23): HTAB (10)
900 PRINT "DIALING: "
910 X = 1
920 A$ = MID$(N$(P),X,1)
930 IF A$ < > " " AND X < LEN
   (N$(P)) THEN X = X + 1
   : GOTO 920
940 NUMBER$ = LEFT$(N$(P),X - 1)
950 PRINT NUMBER$
960 INVERSE
970 VTAB (23)
980 POKE MDM,( PEEK (MDM) + 4)
990 FOR J = 1 TO 2000: NEXT
1000 FOR Y = 1 TO X
1010 HTAB (18 + Y)
1020 DIGIT$ = MID$(NUMBER$,Y,1)
1030 PRINT DIGIT$;
1040 GOSUB 1420: REM DIAL DIGIT
1050 IF PEEK (- 16384) > 127
   THEN POKE MDM,0: RUN
1060 NEXT Y
1070 NORMAL
1080 HTAB (10)
1090 VTAB (24)
1100 PRINT "WAITING FOR CARRIER";
1110 RETURN
1120 REM WAIT FOR CARRIER
1130 COUNT = 0
1140 A = PEEK (MST)
1150 IF A < > 176 AND COUNT < 10

```

DOSDIAL

```

THEN .FOR X = 1 TO 750: NEXT
X:COUNT = COUNT + 1: GOTO 1140
1160 RETURN
1170 REM BE A TERMINAL
1180 HOME : HTAB (10): INVERSE
1190 PRINT "ON LINE" BEL$
1200 NORMAL
1210 CALL 8192
1220 PRINT
1230 GOSUB 1590
1240 RETURN
1250 REM DO MENU LINES
1260 HTAB (10)
1270 VTAB (6 + OP)
1280 PRINT N$(OP)
1290 HTAB (10)
1300 VTAB (6 + P)
1310 INVERSE
1320 PRINT N$(P)
1330 NORMAL
1340 RETURN
1350 REM DO GET
1360 A = PEEK (- 16384)
1370 IF A < 128 THEN GOTO 1360
1380 A = A - 128
1390 A$ = CHR$ (A)
1400 A = PEEK (- 16368)
(DIGIT$) > 57 THEN RETURN
1450 A = VAL (DIGIT$)
1460 IF A = 0 THEN A = 10
1470 FOR I = 1 TO A
1480 FOR J = 1 TO 21: NEXT
1490 POKE MDM,( PEEK (MDM) + 4)
1500 FOR J = 1 TO 43: NEXT
1510 POKE MDM,( PEEK (MDM) - 4)
1520 NEXT I
1530 FOR J = 1 TO 510: NEXT
1540 RETURN
1550 REM SAY NO CARRIER
1560 VTAB (23)
1570 HTAB (19)
1580 PRINT NUMBER$;
1590 VTAB (24)
1600 HTAB (10)
1610 INVERSE
1620 CALL - 868
1630 PRINT "NO CARRIER";
1640 POKE MDM,( PEEK (MDM) - 4)
1650 NORMAL
1660 A = PEEK (- 16368)
1670 FOR X = 1 TO 2000
1680 A = PEEK (- 16384): IF A >
127 THEN X = 2000
1690 NEXT X
1700 B = PEEK (- 16368)
1710 RETURN
1720 REM HANDLE NO CARRIER

```

```

1730 GOSUB 1550
1740 IF AFLG = 1 AND A > 127
THEN AFLG = 0
1750 IF A = 193 THEN AFLG = 1
1760 REM TEST FOR AUTODIAL
1770 IF AFLG = 0 THEN GOTO 510
1780 VTAB (3): HTAB (10): INVERSE
1790 PRINT "HIT ANY KEY TO "
1800 HTAB (10)
1810 PRINT "ABORT AUTODIAL "
1820 NORMAL : GOTO 520
1830 REM SAY GOODBYE
1840 NORMAL : HOME : HTAB (10)
1850 PRINT "DOSDIAL OFF LINE"
1860 END
1870 DATA 173,168,192,173,168,192,169
1880 DATA 13,141,168,192,173,0,192,201
1890 DATA 128,48,12,41,127,201,5,240
1900 DATA 68,141,168,192,173,16,192,173
1910 DATA 173,192,41,1,201,1,208,228
1920 DATA 32,85,32,173,168,192,41,127
1930 DATA 105,127,32,69,32,32,61,32,32
1940 DATA 80,32,76,11,32,201,138,240
1950 DATA 3,32,240,253,96,201,225,144
1960 DATA 6,201,251,176,2,73,32,96,169
1970 DATA 96,76,87,32,169,160,164,36
1980 DATA 145,40,96,32,85,32,96,255

```

Program 2.
You don't actually need this bit unless you want to change the terminal.

```

: COPYRIGHT 1983 (C)
: STEVE RIMMER
:INPRIT EQU $COAB ;DATA PORT
:STAT EQU $COAD ;STATUS PORT
:LTERM EQU $C000 ;KEYBOARD PORT
:STROBE EQU $C010 ;KEYBOARD STROBE
:POINT EQU $28 ;POINTER TO CURSOR
:HORIZON EQU $24 ;HORIZONTAL POS
:
: ORG $2000
:
TERM LDA INPRIT ;WAKE UP
LDA INPRIT ;PORT
LDA #$0D ;SEND CR TO PORT
STA INPRIT ;TO WAKE UP BBS
TERM LDA LTERM ;GET KEYBOARD STATUS
CMP #$80 ;IS THERE A CHARACTER?
BMI TERML ;NO, LOOK AT MODEM
AND #$7F ;CLEAR OFF STROBE BIT
CMP #$05 ;SHALL WE AWAY?
BEQ EXIT ;YES, GET LOST
STA INPRIT ;FLING AT MODEM
TERML LDA STROBE ;RESET KEYBOARD
LDA STAT ;PEEK AT MODEM STATUS
AND #$01 ;SEE IF THERE'S
CMP #$01 ;A CHARACTER WAITING
BNE TERM ;NO, BACK TO KEYBOARD
JSR CUROFF ;KILL CURSOR
LDA INPRIT ;GET CHARACTER
AND #$7F ;MASK PARITY

```



ADC	#\$7F	:CONVERT TO APPLE
JSR	CONVERT	:MAKE UPPER CASE
JSR	TYPE	:SEND TO SCREEN
JSR	CURON	:REINCARNATE CURSOR
JMP	TERM	:DO IT ALL AGAIN
;		
TYPE	CMP	#\$8A :STRIP LINE FEED
	BEQ	NOPRT
	JSR	\$FDFO :SEND TO SCREEN
NOPRT	RTS	
;		
CONVERT	CMP	#\$E1 :IS IT BIGGER THAN a?
	BCC	NOCON :
	CMP	#\$FB :IS IT LESS THAN z?
	BCS	NOCON :
	EDR	#\$20 :COVERT TO UPPER CASE
NOCON	RTS	
;		
CURON	LDA	#\$60 :FLASHING SPACE
	JMP	SHOWIT
CUROFF	LDA	#\$A0 :BLANK SPACE
SHOWIT	LDY	HORIZON :GET HORIZONTAL POSITION
	STA	(POINT),Y :POINT TO CURSOR
	RTS	
;		
EXIT	JSR	CUROFF :SNUFF CURSOR
	RTS	:BACK TO DOSDIAL
;		

doesn't do anything... it just gets executed and then the processor goes on to the next

thing on its list. Thus, you can delete parts of a program by replacing its instructions with NOPs.

The decimal value for NOP is 234, so when you want to NOP some of the machine code in the DATA statements at the end of the program, replace the offending data elements with 234.

To begin with, to disable the sending of an initial carriage return when you pop into terminal mode, NOP the 169 that's the last number in line 1870 and the 13, 141, 168, and 192 in line 1880.

The other thing you could be up for is to disable the upper case conversion routine if you have a fruit with a lower case ROM in its forty column mode. To do this, NOP the numbers 32, 69, and 32 in line 1930.

This program will run with the PDA card hooked to a simple autodialing modem, such as a Novation AutoCat. This is a modem which can translate the level on pin twenty five of its RS232 port to a corresponding phone line level. It won't work with simple modems, like the EMP deals, because they aren't up for doing dialing.

The program can be adapted to work with other serial port cards, but they have to be able to dial. If your card has nothing connected to pin twenty five of its DB25 connector you are verily sunk.

Also keep in mind that adapting this thing to work with other cards will require changing all the card related addresses.

Seed Your Apple

This is a very simple terminal package, but it will do much of what the expensive store bought ones put out... and with a really low cost communications card. It's convenient to use and, so far as we know, devoid of multiple legged crawlly creatures.

The phone lines await the tread of your foot and the ring of your sword upon the poles. Go forth, brave caller, and vanquish the evil and potentially uncool busy signal. Rescue the fair message from its place of capture and return, once more, to the safety of your own three bedroom semidetached cliff.

There's a good warrior.

CNI

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There are plenty of terminal programs for the Apple II and its emulators. Some dial, some download, some even nurse your poor motherless wombats when they're lonely and scared at two in the morning. However, only DOSDIAL is this splendidly cheap.

DOSDIAL is a hybrid Applesoft and machine code package for fast operation and easy modification. It features a phone number library and automatic dialing. It operates on any fruit with a PDA 232C serial card and an autodial modem. A complete source file of the assembler code is included to allow it to be quickly patched for other serial cards.

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The Zorba

The Zorba is a good little portable business system, with lots of bells and whistles. However, it really starts dancing around and singing like a stoned gypsy when it's applied as a personal system and you want to make it do something tricky.

by Steve Rimmer



Now you'd think that something called the Zorba would be a sports car or a movie from the 1960's... certainly it seems like an unusual name for a computer. However, the Telcon Corporation of Fort Lauderdale, Florida have obviously decided that there was some good reason for calling their first entry into the microcomputer market such. Perhaps it stands for something.

The Zorba looks extremely similar to the Osborne that no longer exists. However, whereas the general case deportment is fairly like that of this dead, departed system, the internals and working bits are rather more adept at coping with the realities of micro processing and other etherial pursuits. The bits that go to make up a Zorba are just splendid, and the final workings are unspeakably good.

This, coupled with a price tag in the area of two and a half grand, makes the little monster an unusually good value for a system.

No Greeks We Could See

The Zorba is a portable CP/M based system. The configuration we got consisted of a computer... you'd expect that... two double sided drives, a green screen monitor and a keyboard which gorges itself onto the front of the case when the thing is off for a stroll around the countryside.

Transforming the Zorba from a suitcase into a computer takes less than a minute even if you are partially asleep. You unhitch the front of its box... the keyboard... heave it on a table or other horizontal phenomenon, plug in the cable that connects it to the rest of the computer, plug in the power cord and boot the system.

Booting a Zorba gives you a funky graphic logo and a flashing message that prompts you to stick a disk in drive A. This points up several things... to wit, the Zorba has some limited block graphics capabilities and its terminal driver can do half

brightness and flashing characters.

The Zorba is moderately snappy cold booting its disks. It has niceties like a keyboard buffer and pretty decent key rollover in use. The keyboard is a bit stiff, but not unworkably so... it feels a bit like that of an Apple. Keyboards are extremely subjective, of course.

The keyboard of the Zorba is really loaded with keys. Aside from the usual QWERTY layout in centre stage there is a row of computer command keys off to the left... cursor movers, control, escape and so on... and a numeric keypad to the right. There are also nineteen function keys up along the top of the thing.

The system configuration utility program provides a function to allow all of the non-alphanumeric keys to be programmed by the user. Thus, for example, the cursor movers can be adapted to your favourite word processor and the function keys made to do your best loved commands. The func-

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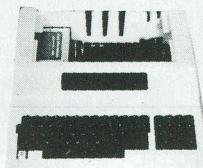
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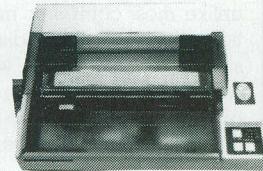
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The Zorba

tion keys can zap out anything up to eighty characters each.

The function key programming is pretty sharp. It allows one to set up all the strings for the function keys and then save them to a disk file for later editing. The strings can contain not only printable literals but imbedded control codes, so that one can actually do pretty complex things with a single keystroke.

In playing with the Zorba, I found that it was useful to have the rightmost function key permanently programmed to type out a menu of what the other eighteen keys did.

The Zorba has a built in monitor which is six inches from corner to corner... somewhat larger than the contact lens in the middle of an Osborne but smaller than the tube on a Kaypro II. When you first check it out, the thing looks pretty small. However, unlike most computer monitors, the resolution of the Zorba's display is extremely sharp. The characters, while minute, are as easy to read as those on a somewhat larger tube because they're so crisp.

The screen displays full eighty column lines.



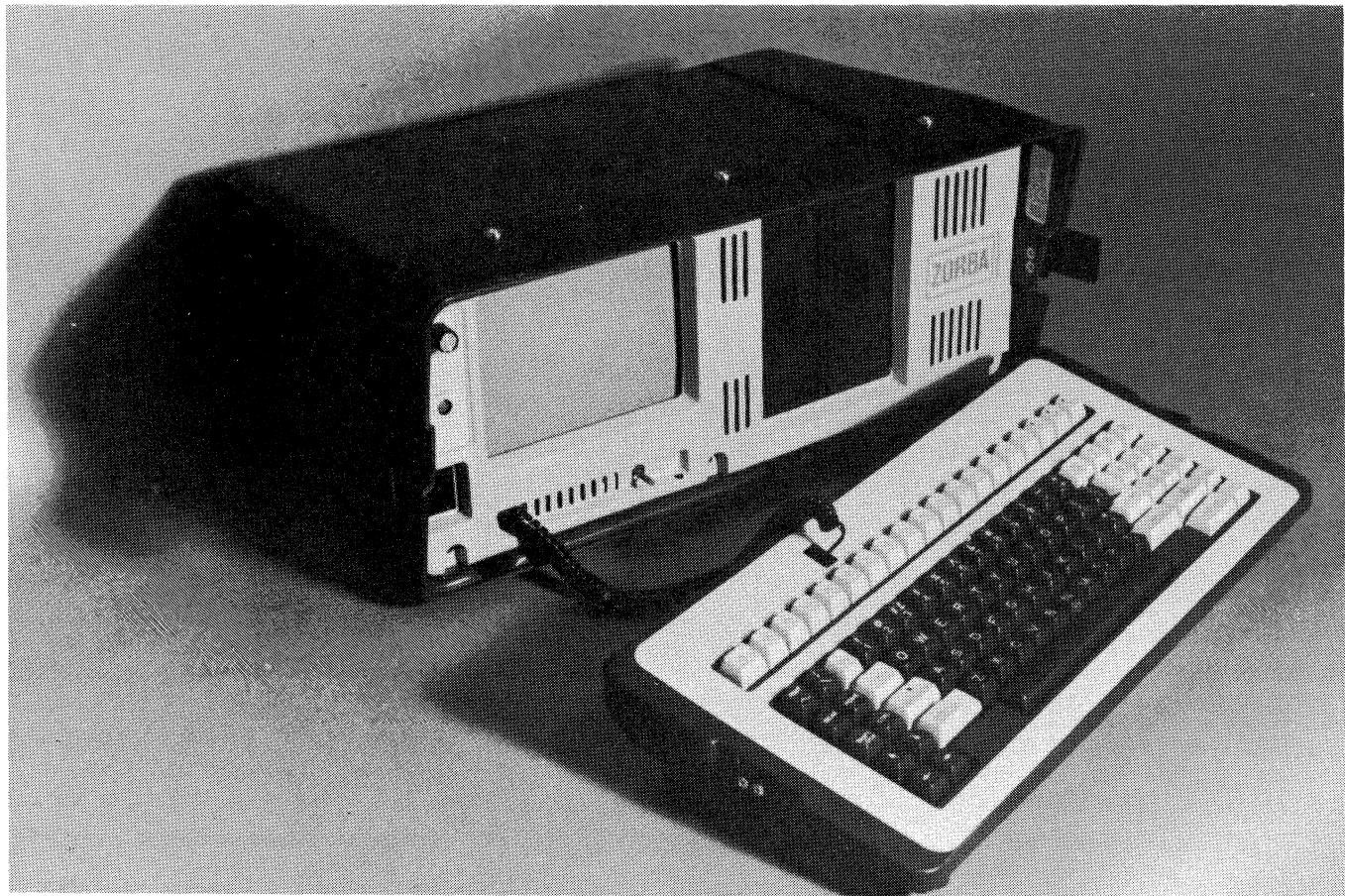
The keyboard of the Zorba is pretty fine. All of the function keys are fully programmable.

Within and Without

The Zorba we got came with Calcstar, Wordstar and Mailmerge among other things, all of which ran fine. Both Calcstar and Wordstar are noted for being fairly loose with the time they take to do things, but the Zorba clipped them along at a pretty good pace. The system accessed its disks quickly and never hiccupped once.

This was one of the few systems we've tried which didn't gorch any disks. A few bad sectors on a disk are part of the circus, and one learns to expect them, but it's a decent to get by without them. The system seems to be unusually adept at error trapping, but, then, as we'll get into, its disk systems are really a trip in most areas.

I actually tried quite a number of pieces



of commercial software on the Zorba. BASIC programs, even big ones like our Stockboy package, ran without any glitches. I ran the Supersoft C compiler and CB80 on the system and patched MODEM7 to work with the troll. Despite the unusual capabilities of the Zorba's CP/M implementation, it acts very normal and even the strangest programs can be made to run on it with no peculiarities.

As a basic computer or a boring, normal portable beastly the Zorba rates very highly indeed. It exhibited no weirdnesses while it was here being scrutinized and has pots of features. It's a blast to use and can be personalized to one's applications with a minimum of hassle through a pack of well thought out utilities provided with the system.

If you get a Zorba to use for dedicated applications like word processing, accounts and so forth, you will probably never discover many of the really inutterably great bits of the system... for they lurk, like nether trolls on illicit substances, within its darkest crevices, whispering among themselves about the situation in Zimbabwe.

Back of the Cave

The least well buried of the Zorba's neat hidden features is its disks. The system comes with two drives, like your average computer, but it supports over thirty disk formats. It will read and write almost any five and a quarter inch disk format commonly found on the planet, including Osborne single density and IBM CP/M 86. This means that if you are going to buy commercial software you can zip on down to the corner computer store and get what you want on whatever medium it happens to be available on. If you are up for trading software, you can do so with virtually anyone without having to worry about porting the stuff between machines.

If you are a software pirate... no, wait, forget that.

In use, the disk system of the Zorba is remarkably simple. Each disk format the thing can work with is assigned to a logical drive number. For example, Osborne is drive O:. This means that to see what's on an Osborne disk you'd put it in drive B: and then say DIR O:.

The system gives you a list of the formats it can read and their logical drives when you boot it. There is also a utility provided with the system to allow one to analyse formats the system doesn't comprehend to allow one to adjust it so it will.

The other thing which makes the Zorba a great system for the serious computer head is that it's unimaginably well

documented. It comes with a complete MAC file of its BIOS, and the M80/L80 package to re-assemble it, so that anyone who feels moved to can make changes to the operating system.

This is something which proves really useful as you get deeper into your computer and, yet, few computer manufacturers provide it with their machines. Most want to sell it to you at a fairly decent price and some won't let it out of their festering clutches for any sum.

The other wonderful bit of low level candor that comes with the Zorba is its fat juicy manual. This tells you everything about the bits that are unique to the machine, like where the screen characters live in memory, how the bank switching works, how to access routines in the BIOS and so on. Again, if you have your eyes on a system for business applications this is probably meaningless but computer hackers will find the information in this book invaluable.

The books for the Zorba are pretty good. There are the standard CP/M and Wordstar books, both of which are indecipherable by anything organic, but there are also several tutorial things produced by Telcon which are pretty decent, especially for new users. In addition to all this, there is something called the Zorba

tutor kit available which contains three audio cassettes to babble you through CP/M, Wordstar and Calcstar... which is also pretty slick.

The Works

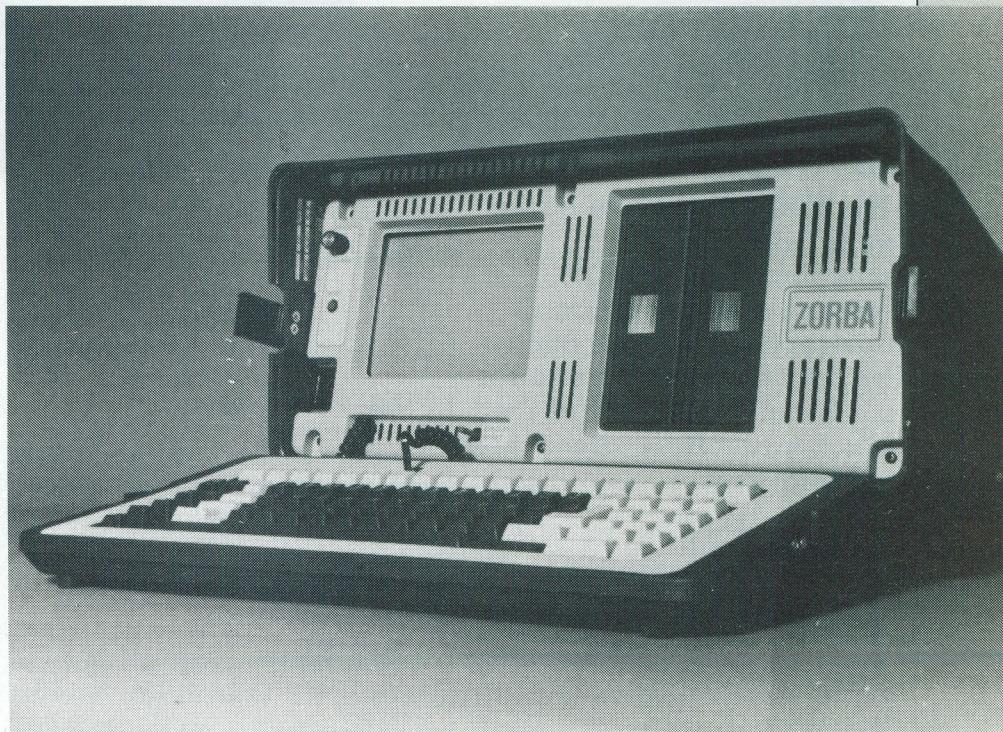
Like Bo Derrick, there is nothing really new in the Zorba... but the same old stuff has been put together unusually well. The computer itself is well built and has all the appropriate appointments... a serial port, a printer port, an IEEE instrument port and an external video connector in case you get uptight at the mini screen. It comes in a genuine fake leather carrying bag which has a side pocket to carry disks and cables.

The complete software bundle which came with our sample of the Zorba consisted of CP/M and its utilities plus M80, L80, the CBASIC language package (see "Beyond BASIC" in the January 1984 issue of Computing Now!... it's very much like CB80), Calcstar, Worstar and Spellstar. Of course, any CP/M software will tool along quite happily on the system.

The Zorba is available from a number of dealers. We got ours from Micro Bazaar, 23 Westmore Drive, Unit 5, Rexdale, Ontario 1-416-745-4740.

Argh, Billy, ouzo an' rum fer the men... bring that computer over here an' I'll figure out how t' lay seige t' the Parthenon...

CN!



Machine Language on the IBM



The IBM PC has one of the most powerful microprocessors yet to emerge from the silicon dungeons. However, controlling that power requires some real command of the black arts. Here are a few incantations.

by Ian Heppel

If you own an IBM Personal Computer, or work on someone else's, you may have considered delving into IBM PC assembly language. Maybe you want to spice up some BASIC programs, or perhaps you have a problem that can only be solved with the speed and power of

machine code. Then again, maybe you're just trying to earn your wizard's cap. This article will give you a brief introduction to the Intel 8088, the microprocessor of the IBM PC and the IBM macro assembler, and will hopefully give you a feel for what to expect when you finally do take the plunge.

What's It Doing?

As I've mentioned, there are plenty of good reasons for working in assembly language. Above all, there's speed. To give you some idea of what is possible, the 8088 chip can move sixteen kilobytes of data into the screen memory so quickly you can barely see it happening. That's something BASIC certainly can't do.

Flexibility is something else assembly language has in its favour. You can do absolutely everything the machine was designed to do.

The standard complaints about assembly language concern the fact that it is

not easy to write. Effective assembly language programming requires an intimate knowledge of the machine, the CPU and the system's software and hardware. Debugging a program that doesn't work the first time often takes more time than writing the program originally did.

In addition, assembly language programs can be difficult to read, making updates and enhancements difficult. A programmer's productivity is generally much greater when working with a high level language such as C or Pascal. Despite this, however, there is no arguing the fact that working in assembly language gives one a knowledge of the machine that just cannot be had elsewhere.

The Intel 8088 Microprocessor

The 8088 will be a welcome change to anyone used to working on the common eight bit microprocessors such as the Z80 or 6502. The chip will directly address one

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Machine Language on the IBM

megabyte of memory. It has twelve sixteen bit data and address registers, as well as a sixteen bit program counter and a sixteen bit status register. You may have wondered how sixteen bit registers can access addresses that require twenty bits to define. The 8088 accesses the extra memory by calculating all effective addresses from a segment value and an offset.

A segment can be defined to start at any sixteen byte boundary in the memory space. In other words, to calculate the start of a segment, you take a sixteen bit number and multiply it by sixteen, giving a twenty bit number. A sixteen bit offset is added to this to get the effective address. The notation usually used to identify a location in memory is `ssss:ffff`, where `ssss` and `ffff` are hexadecimal numbers defining the segment and the offset respectively. The addition, again, is done in the following way:

ssss0
ffff

aaaaa

where `aaaaa` is a hexadecimal representation of the effective address.

Segmentation is probably the most fundamental difference between the 8088 and the common eight bit microprocessors, and is easily one of its more powerful features. We'll look at more on this later.

The registers of the 8088 can be divided into three functional groups. There are data registers, the segment registers, and index/pointer registers. There are four data registers. The accumulator, or AX register, is the fundamental data register and is basic to many instructions. The base register, or BX, is used often as an address register. The count register, or CX, is used as a counter in many multiple byte and looping instructions. The data register, or DX, is basic to some instructions and also to most I/O operations.

All four data registers can be used as general purpose registers in most data move instructions, and can be broken down into the eight bit registers AH, AL, BH, BL, CH, CL, DH, DL.

There are four segment registers, used to define distinct areas of memory for specific purposes. The code segment register, CS, defines the segment in which the program resides. This register can only be changed by instructions which change the value of the program counter. The stack segment register, SS, points to the bottom of the stack. The data segment register, DS, generally points to data structures such as variables and arrays. The extra segment

register, ES, points to something "extra", and is used as a parameter in some instructions.

At this time it seems appropriate to point out a couple of the advantages of a segmented memory organization. One is the fact that segmentation is a convenient way of separating program memory, stack memory, and data memory. Another is the fact that relocating object code is an easy task with the 8088 since the segmented addressing allows us to define any sixteen byte interval to be the effective zero location.

The pointer/index registers serve mainly to address memory. These are the stack pointer, SP, the base pointer, BP, the source index, SI, and the destination index, DI. The purpose of these registers will be made more clear when we talk about addressing modes.

The instruction pointer, IP, always points to the next instruction to be executed. This register is only changed by instructions that transfer control of the CPU, such as jump instructions. It has a function only slightly different from that of the program counter, PC, which points just past the current instruction, but doesn't take into account a possible transfer of control.

There are nine status flags used by the

8088. In the interest of brevity, I will simply list them off. The purpose of each is fairly obvious.

Carry flag CF
Parity flag PF
Auxiliary carry flag AF
Zero flag ZF
Sign flag SF
Trap flag TF
Interrupt enable flag IF
Direction flag DF
Overflow flag OF

Many of these flags are used in branching instructions. The AF is used mostly for binary coded decimal arithmetic, while DF is used to determine the direction of string moves and IF is used to protect sections of code from interrupts. TF is used in debugging operations, allowing the processor to single step.

For any addressing mode, the default segment can be changed using the segment override operator. For example, if you wanted to store certain data structures in the extra segment rather than the data segment, you would use the operator ES in front of your address expression, as in

MOV AX,ES:ADDR[SI]

The 8088 Instruction Set

Data Registers

AH	AL
BH	BL
CH	CL
DH	DL

Index Registers

SP
BP
SI
DI

Program Counter

PC

Segment Registers

CS
DS
SS
ES

Status Register

--

The register set of the Intel 8088 microprocessor.

The most basic kind of assembly language instruction is one that performs a transfer of data. The most common of these is the MOV instruction, although there are many others which deal with registers, data memory, or stack memory. In particular, there are the string instructions that can move a block of bytes or sixteen bit words all at once.

The arithmetic instructions of the 8088 are much more powerful than those of eight bit CPUs. The four common operations are available, along with instructions to increment, decrement, and negate. Also available is the ability to use different word lengths and different number formats, namely binary, BCD and ASCII. Perhaps most notable to users of eight bit CPUs is the presence of multiply and divide operations.

Another group of instructions are those that treat a byte as a pattern of bits rather than a numeric quantity as such. These are used extensively in applications such as graphics, data communications and boolean algebra.

Transfer of control instructions are some of the most used and the 8088 has lots of them. There's the procedure call, the unconditional jump and eighteen conditional jumps. There is also a set of instructions that replace the familiar combination of counter decrements and conditional jumps. These are the LOOP instructions.

Interrupt instructions will be an important part of any serious programming you

do on an IBM PC. An interrupt is essentially a procedure call, except that the status register is pushed on the stack along with the program counter. Interrupts can be triggered when hardware devices such as keyboards or disk drives request access to the system, or in software when the INT instruction is used.

There are two hundred and fifty six interrupts available, and Intel, IBM, and the operating system authors have reserved many of them for specific purposes, mostly I/O functions. The first one kilobyte of RAM is reserved for the four byte interrupt vectors.

The Last Byte

This is certainly not all there is to programming the 8088 on the IBM... however, it will give you a start in understanding the working of this powerful chip.

In the end, I believe you'll find assembly language programming worthwhile. You'll soon be writing very naturally in the language, and of course, the tools and tricks that you create in one program can easily be incorporated into another. The speed and power alone will be worth the effort, not to mention that elusive wizard's cap.

CN!



The IBM contains a microprocessor which can address a megabyte of RAM with thousands of instruction permutations. Programming that processor can be involved.

ORGANize your Apple



You can't play music on a typewriter keyboard... not unless you are into a really techno-destructive new wave trip. However, you can play music on your fruit if you add another keyboard. Here's the basis of the hardware involved.

by Steve Rimmer

Music cards and music playing programs for one's computer are everywhere. However, interfacing these to one's own brain can be a somewhat more difficult procedure than devising the actual hardware that makes noises. Invariably, you create acoustic phenomena with a computer sound generator by loading values into registers, but you can't really do decent art by fuguing away on the PEEKs and POKEs.

Music editors are better. A music editing program will allow you to compose a score in proper musical notation. Really decent ones are like musical word processors, with provisions for insertion, deletion, block operations and so on.

Of course, you have to be a munchkin on speed to compose in real time.

No matter how clever one becomes in writing music editing programs, nothing can beat a true genuine full sized organ type keyboard as a music performance device for a computer. It's the only practical way to actually play, rather than program, a computer music system.

In fact, a keyboard is not really that hard to do. The one we'll be looking at here is capable of being fully polyphonic and really uncomplicated. All of its scanning and decoding is left to its driving software, so it can be interfaced to any of a number of popular music cards.

We'll be looking at specific implementations of it in later issues. This project is a really basic trip to get into the rudest beginnings of the interface.

While this version is done up on an Ap-

ple II and clones thereof, it really just hooks up to two plain vanilla eight bit ports, so it can be done on virtually any system with a bit of hacking.

Finally, we have been able to find a source of keyboards in Canada. Thinking about this risks total cerebral dislocation, I know. The complete details are given at the end of this feature.

The Key To It

The keyboard shown here is really just a set of momentary contact normally open switches arranged in a long line. This is not unlike the arrangement usually found in a computer's QWERTY keyboard. The only difference in the two situations is that this keyboard wants to be able to detect multiple keys down at once and make sense of them... it calls this polyphony... while a typewriter style keyboard wants to ignore them... thinking it has rollover.

In order to make this thing all happen, what we need is a way to let the computer sequentially inquire as to whether each of the sixty one keys on the organ keyboard has been depressed. If it discovers that one

or more is down, we'll want it to do something with the information.

In the accompanying program, the keyboard is scanned each time the program is called. As the computer scans up the keyboard, it deposits the number of each key it finds down... from zero to sixty one... in a buffer and increments a pointer. Thus, for example, if keys ten, twelve and fifteen were to be down when the scan came through, you would be left with a pointer value of three... the number of keys down... and the buffer holding the numbers ten, twelve and fifteen.

You invariably won't be able to use this particular program in your application because that's the way the gods work these days. However, once you understand the scanning and decoding functions which go along with the keyboard you should have no trouble writing a similar routine of your own that will happen with your stuff.

A Bit Of Everything

In order to make the computer read the status of the keyboard, it must have some ports. In this case, I've used a John Bell VIA card which plugs into the Apple and gives it four eight bit ports. The source for this thing is given at the end of this article.

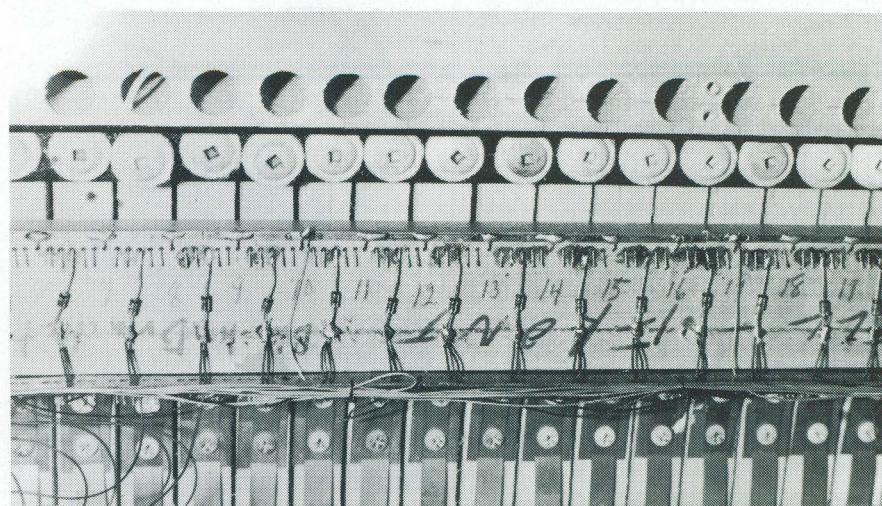
In fact, we will only be using two ports.

The keyboard is wired up as shown. The sixty one diodes are a pain, to be sure. In this arrangement, we have eight banks of eight switches each. One eight bit port selects the bank to be read and one the switches in that bank.

You can do this with a single eight bit port, in fact, but it takes more hardware.

It may be easier to understand the scanning of the keyboard if you think of it as be-

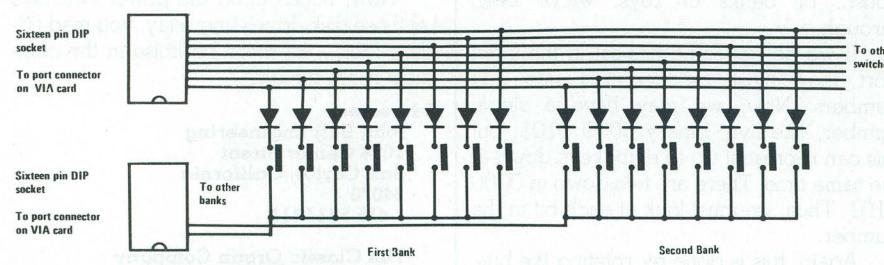
:SKELETAL KEYBOARD SCANNING
:ROUTINE FOR ORGANIZE
:KEYBOARD COPYRIGHT
:(C) 1983 STEVE RIMMER
;(very preliminary)



This is a section of the prototype ... which was hand wired. Commercial keyboards forgive this delight.

BASE EQU \$C700 ;BASE OF 6522	LOOP ROR A ;FIRST KEY
START EQU \$2000 ;CALL TO RUN	BCS HIGHBIT ;GOT ONE?
IMPORT EQU BASE ;INPUT PORT	NBIT INY ;NEXT COUNT
OUTPORT EQU BASE+1 ;OUTPUT PORT	CPY #\$08 ;ALL DONE?
INDDR EQU BASE+2 ;INPUT DDR	BCC LOOP ;LOOP IF NOT
OUTDDR EQU BASE+3 ;OUTPUT DDR	JMP NEXT ;GET NEXT BANK
ORG START	HIGHBIT PHA ;SAVE A
;	STX STORE ;SAVE X
LDA #\$FF ;SET UP	LDX #\$00 ;ZERO X
STA OUTDDR ;...DATA	TXA ;ZERO A
LDA #\$00 ;...DIRECTION	CLC ;CLEAR FLAG
STA INDDR ;...REGISTERS	ROL A ;MULTIPLY
LDA #\$00 ;ZERO INDEX	CLC ;...A
STA INDEX	ROL A ;...BY
LDX #\$00 ;ZERO COUNT	CLC ;...EIGHT
LDA #\$01 ;FIRST BANK	ROL A
;	CLC
BANK STA OUTPORT ;SELECT IT	ROL A
LDA IMPORT ;SEE WHAT	TXA ;
CMP #\$00 ;HAPPENS	STY STASH ;
BEQ NEXT ;LOOP IF NO	ADC STASH ;
;	LDX INDEX ;POINT INTO
LDY #\$00 ;COUNT KEYS	INX ;...BUFFER
CLC ;CLEAR FLAG	STA TABLE,X ;SAVE BYTE
;	STX INDEX ;UPDATE INDEX
PLA	PLA ;GET A BACK
LDX STORE	LDX ;GET X BACK
JMP NBIT	JMP NBIT ;GETNEXT BIT
NEXT ROL A	NEXT BANK
INX	NEXT COUNT
CPX #\$08	ALL DONE?
BCC BANK	BCC BANK ;LOOP
RTS	RTS ;BACK TO CALLER
;	FIXED DATA
INDEX DS 1	INDEX DS 1
TABLE DS 61	TABLE DS 61
STASH DS 1	STASH DS 1
STORE DS 1	STORE DS 1

61 momentary contact switches on keyboard.



Two of the eight switch banks of the keyboard. The two DIP plugs are wired so as to correspond to the connectors on the parallel port card.

ORGANize your Apple

ing switches and voltage levels. The I/O ports on the VIA card can be set so that each of the sixteen I/O lines we're using here will be either at zero volts, a logical zero, or five volts, a logical one.

When you put the number one into a port, you are setting the first line to five volts and all the others to zero volts.

Conceptually, the first line of the output port is connected to the common bus of the first eight switches on the keyboard. The second line gets the second bus, the third line the third bus and so on. If you POKE the number one, or 0000 0001 binary into the output port the first bank of switches will have five volts on its bus. We'll call this the active bank.

Now we'll have the computer take a look at the status of the input port. Each of the eight switches in the bank is hooked to one line of the input port. I know... there are actually eight switches on each line of the port, because each line has one switch from each of the eight banks. However, since we are only going to allow one bank to be active at a time the status of the switches in the other banks won't really matter.

Imagine, then, that the keyboard only has eight keys. The first one goes to line one of the input port, the second to the second line of the port, and so on.

Now, if the first key is down, the first line of the port will be held high... five volts, and the number in the port will be one, or, properly, binary 0000 0001. If the third key is held down too the number will be five, binary 0000 0101. The five is two to the power of zero plus two to the power of two.

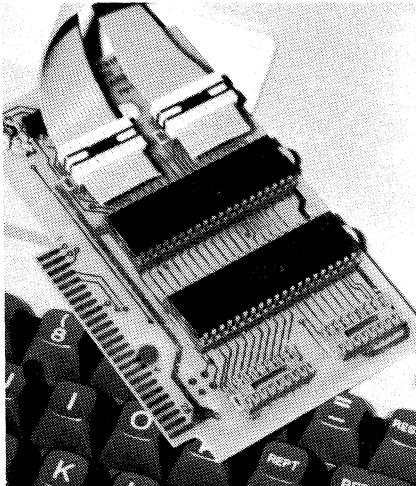
To decode the whole keyboard, we simply repeat this process for each bank. Selecting bank two entails POKEing a two, binary 0000 0010, into the output port. Bank three would be four, binary 0000 0100, and so on.

This is an inconvenient way of reading the keyboard, but it's useful because all of the decoding is done in software, which means that the computer can look at the keyboard whenever it feels like it, and the driving software can be designed to match whatever the keyboard is supposed to play through with a minimum of hassle.

Furthermore, it can be adapted to other systems fairly simply.

Ze Program

The sample program shown here should illustrate the workings of a typical decoder. You'd stick it in a larger program which would call it every time it wanted to check the status of the organ keyboard. This program assembles to run in high resolution



The John Bell parallel port card.

page one. You may well want to relocate it... just change the value of START.

When this thing returns, there will be a number between zero and sixty one in INDEX. This is the number of keys down when the program ran. Beginning with TABLE there will be a list of the keys that were down.

Only the number of bytes in TABLE encompassed by the INDEX value should be considered valid. Everything beyond this will be garbage left over from previous scans.

When this thing is called, it makes the output port output, the input port input and the table index zero. Then it loads the accumulator with binary 0000 0001. The accumulator holds the pointer to activate the first bank of the keyboard. Stuffing this into the output port makes the first bank active.

If the input port holds zero after this it can be assumed that no keys in that bank are down. At this point, the program will select the next bank and try again. To do this, it rotates the bit in the accumulator left by one. Binary 0000 0001 becomes 0000 0010, selecting the second bank.

At the same time we'll increment the X register to keep track of how many rotations... or banks of keys, we've been through.

If we do get some bits set in the input port they must be decoded into key numbers. Now, we may have a single number, like five, binary 0000 0101, but this can represent up to eight keys down at the same time. There are two down in 0000 0101. Thus, we must look at each bit in the number.

Again, this is done by rotating the bits. The trick here is that when you rotate the bits one always falls off the end. In fact, it falls into the carry bit, so it's easy to tell

whether we've got a key down by simply rotating through to its bit and testing the status of the carry bit.

The Y register is used to count the number of times the bits are rotated.

When a high bit is found, we can compute the value of its key as being the value of Y plus eighty times the value of X. Having done this, the number can get stashed in the appropriate place in the buffer and forgotten about.

Getting Your Chops Together

This thing should be pretty easy to put together. The John Bell card will either have to be purchased or synthesized... I'd go for buying it myself. This program assumes that you'll be using the lower two ports on the card and that the card itself is in slot seven.

Keyboards can be come by in a number of fashions. You can go for the old wooden ones, as I did for this prototype. They are available from many organ repair and construction places... who often have them around having sensibly ripped them out of organs in favour of plastic ones with gold contacts. These are horrible... they bounce a lot... but you can make them work. You have to wire in sixty one diodes and a lot of bus wires by hand... it takes about four evenings if you do it while watching the tube.

There is, however, a better way. You can get proper keyboards with gold contacts and big printed circuit boards which hold all the diodes and do all the bus wiring for you. They are being supplied by The Classic Organ Company up in Markham, Ontario. The prices haven't been worked out as of this writing... you gotta contact them.

They figure that there may be a pretty decent demand for them, so allow a fair bit of time for delivery and postal weirdnesses.

There are a number of music cards that this thing can be interfaced to... I haven't included any specific implementations in this article because of space considerations. Furthermore, if there was nothing to stick in later issues I'd be out of a job.

Now, hands upon the power switches. Let those disk drives sing. Play, you mad fiddling fools... let there be noise in the computer room tonight!

Addresses:

John Bell Engineering
1014 Center Street
San Carlos, California
94070
1-415-592-8411

The Classic Organ Company
300 Don Park Road, Unit 12
Markham, Ontario
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The Gemini Within



The Gemini 10 printer is pretty common these days, and really cheap... a worthwhile attribute, this. It has many of the features of much more expensive printers, too, although some users will have a hard time figuring out how to get at them. We herewith present a quick solution.

by Steve Rimmer

The Gemini 10... and its large family of cousins... is a really useful and highly cheap little beast. We have a number of them here, with the eldest of the clan having been putting dots to paper for about six months now without

having freaked once. This is pretty good, 'cause we lay down a lot of dots.

Aside from just dotting happily away, the Gemini 10 has all manner of existential features that make it splendid... it can do different sizes and styles of print, effects and even bit mapped graphics. However, accessing all of this can be a downer, as it involves sending a raft of escape sequences to the printer to change its parameters. These are a joy to remember and type in each time you want to use the thing.

The STAR program shown here is a simple way around all this. It's a menu driven code selector which allows one to send the right escape sequences to the printer even after the pages of the Gemini manual have faded into obscurity. It can be assembled on any CP/M based system with ASM or MAC. The codes, listed in TABLE, can be altered to suit your own space.

Print or Write

It's probably vital to note that this program listing is done in the compressed mode of the Gemini... which it got into from the STAR menu.

The program is fairly simple. It prints up the menu of possible printer attributes and asks for a number between one and nine. Nine is the quit command. Anything else will result in an escape sequence being sent to the printer.

If you type anything except one to nine, the program will ignore your input and show you the menu again.

The heart of the program is TABLE. The first entry in each line of the table is a literal... the characters '1' through '8'. The program compares your entry to these literals. At this point, we know that your entry must be one of them. When it finds the one that matches it, it jumps to a routine which sends an escape character followed by the rest of the table entry followed by a bell character to the printer.

This saves having a huge number of CPI and JZ combinations for each character string.

The table has some entries with the character DUM in them. This is a padding character which is filtered out prior to the great print. It makes all the strings the same

```

; GEMINI 10 PRINTER SETUP
; UTILITY
; COPYRIGHT (c) 1983 STEVE RIMMER
;
; Not for commercial distribution without
; the author's written permission
;
; B005 EQU 0005H
; CR EQU 13
; LF EQU 10
; CLS EQU 26 :CHARACTER TO CLEAR SCREEN
; TAB EQU ?1'-40H
; ESC EQU 27 :ESCAPE
; BEL EQU ?7 ;BELL
; DUM EQU 255 :DUMMY PAD CHARACTER
; PRINT EQU 5 :B005 CALL TO SEND CHARACTER
; :TO PRINTER
;
; ORG 0100H
;
; LXI H,0 :SAVE THE STACK
; DAD SP :SAVE THE WHALES
; SHLD STACK
; LXI SP,STACK
;
; START:
; MVI C,9
; LXI D, MENU
; CALL B005 :SHOW THE MENU
;
; MVI C,1
; CALL B005 :GET SELECTION
; CPI ?9
; JZ FINIS :IF 9, QUIT
; CPI ?1
; JM START
; CPI ?9
; JP START :MAKE SURE IT'S VALID
;FALL THROUGH TO LOOKUP TABLE
; LXI H, TABLE :POINT TO TABLE
; LOOP CMP M :LOOK TO SEE IF IT'S OUR OPTION
; JZ LIST :IF YES, SEND CHARACTERS TO GEMINI
; INX H
; INX H
; INX H :POINT TO NEXT ENTRY
; JMP LOOP :TRY AGAIN
;
; LIST:
; MVI E,ESC :PRINT ESCAPE
; CALL SEND
; INX H :POINT TO NEXT CHARACTER
; MOV E,M
; CALL SEND
; INX H
; MOV E,M
; CALL SEND
; MVI E,CR
; CALL SEND :SEND SELECTED CODES
; MVI E,BEL
; CALL SEND :SOUND BELL
; JMP START :ANOTHER SELECTION?
;
; SEND:
; MOV A,E
; CPI DUM :DON'T PRINT PAD CHARACTERS
; RZ
; PUSH H :SAVE THE POINTER
; MVI C,PRINT
; CALL B005 :SEND CHARACTER TO GEMINI
; POP H :GET THE POINTER BACK
; RET
;
; FINIS:
; LHLD STACK
; SPHL ;RESTORE STACK
;
; RET :BACK TO CP/M
;
; ***FIXED DATA
;
; MENU:
; DB CLS,LF,LF,LF,CR
; DB TAB,TAB,TAB,'Gemini 10 Printer control program',CR,LF
; DB TAB,TAB,TAB,'-----',CR,LF
; DB LF,LF
; DB TAB,'1. Compressed type',CR,LF
; DB TAB,'2. Expanded type',CR,LF
; DB TAB,'3. Normal size type',CR,LF
; DB TAB,'4. Medium type',CR,LF

```

```

DB TAB.'5. Italic type',CR,LF
DB TAB.'6. Bold type',CR,LF
DB TAB.'7. Underline',CR,LF
DB TAB.'8. All parameters reset',CR,LF
DB TAB.'9. Quit',CR,LF
DB LF,LF
DB TAB.'What will it be? '
DB '9' ;END MARKER MUST BE HERE
;
TABLE:
DB '1',66,3 :COMPRESSED MODE
DB '2',66,1 :EXPANDED MODE
DB '3',66,2 :NORMAL MODE
DB '4',53,DUM :NORMAL TYPE
DB '5',52,DUM :ITALIC TYPE
DB '6',69,DUM :EMPHASIZED TYPE
DB '7',45,1 :UNDERLINE
DB '8',64,DUM :SOFTWARE RESET
;
DS 60
STACK DS 2 :LOCAL STACK
;
END

```

length to keep the table scanning code manageable.

Once a sequence has been sent the program essentially restarts itself. You can send as many codes as you like. If you are struck by a blinding flash of revelation and realize that you don't like what you've done, you can do a reset, selection eight, and the printer will be as if it had been just powered.

Power Of Print

You do not, of course, have to use the codes

I've put in the program. If, for example, underlining is of no real use to you, it can be replaced with any other escape sequence... they're all outlined in the back of the Gemini manual. If you were up for making selection seven set the printer up to do double striking you would make the string after '7' in the TABLE 71,DUM... and change the corresponding words in MENU.

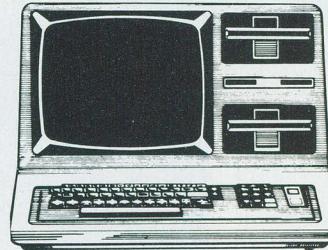
Keep in mind that this program always sends an escape character before it lays one of these strings on the hapless Gemini, so you can't program it to send any of the single control character codes that also make the printer do funny things. This probably won't matter, as pretty well all of the single character functions can be duplicated with escape sequences.

By the way, if you have one of the rare and elusive serial Gemini printers, and have your system configured so that it is seen as the PUN:, rather than the LST: device, you can still use this little troll. Simply change the PRINT equate value to four and all the codes will stream out through the serial port of your system.

It's STARtling.

CN!

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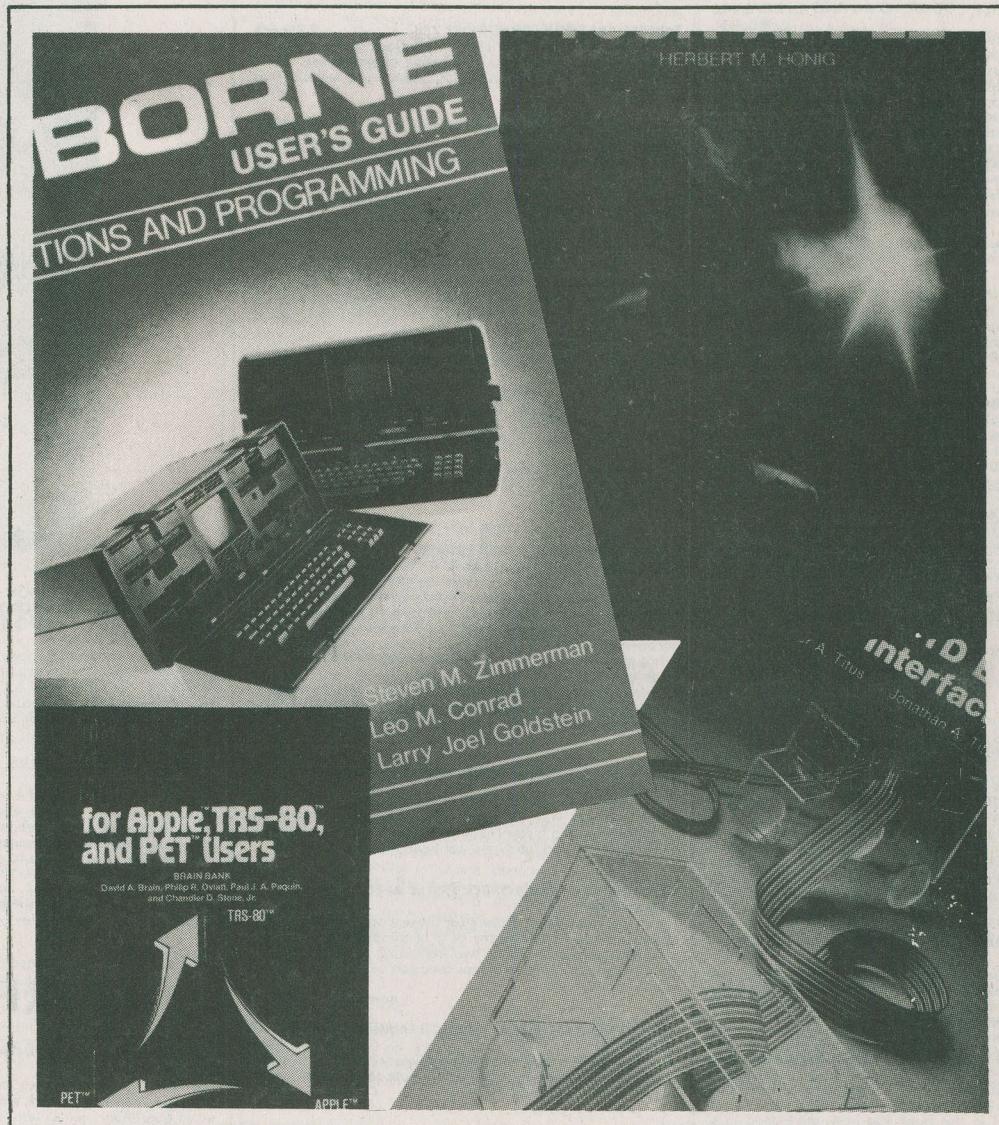
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by Collyn Rivers



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M. JAMES

\$7.60

The 6809 microprocessor's history, architecture, addressing modes and the instruction set (fully commented) are covered. In addition there are chapters on converting programs from the 6800, programming style, interrupt handling and about the 6809 hardware and software available.

AN INTRODUCTION TO MICROPROCESSORS EXPERIMENTS IN DIGITAL TECHNOLOGY

HB07:

\$15.95

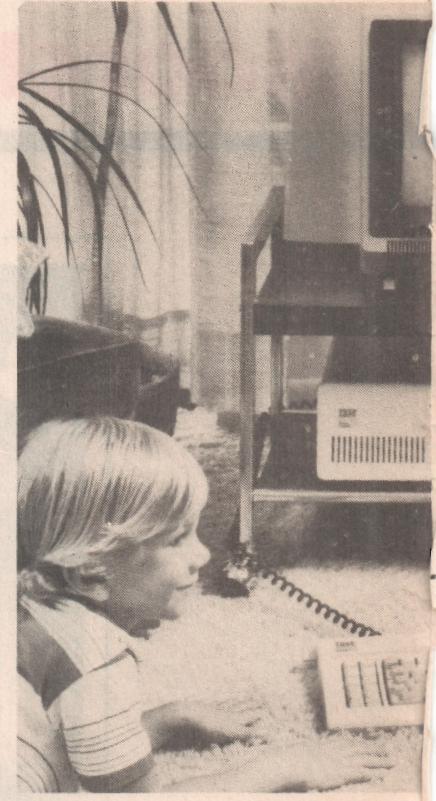
SMITH A "learn by doing" guide to the use of integrated circuits provides a foundation for the underlying hardware actions of programming statements. Emphasis is placed on how digital circuitry compares with analog circuitry. Begins with the simplest gates and timers, then introduces the fundamental parts of ICs, detailing the benefits and pitfalls of major IC families, and continues with coverage of the ultimate in integrated complexity — the microprocessor.

BASIC MICROPROCESSORS AND THE 6800

HB06:

\$23.95

Provides two books in one: a basic guide to microprocessors for the beginner, and a complete description of the M6800 system for the engineer. Each chapter is followed by a problem section.



SB21877: MICROPROCESSOR CIRCUITS, VOLUME 1: FUNDAMENTALS AND MICROCONTROLLERS

\$13.95

Intended for service technicians, computer technicians, industrial control personnel, students, hams, and others who need to learn microprocessor basics. Brings you a chance to learn microprocessor theory and gain valuable practical experience at the same time! Excellent for home study and in-plant training. Features actual demonstration circuits easily built with solderless boards and readily available chips and parts.

SB21828: DON LANCASTER'S MICRO COOKBOOK, VOLUME 1

\$22.50

The first in a new series of Lancaster cookbook volumes intended to show you how microcomputers and microprocessors work, and how you can personally build your own skills to profit from and enjoy the micro revolution. After an easy introduction to micro-basics and a set of real-world rules for winning the micro game, you'll explore the essential number systems, hardware and software logic, mainstream codes and standards, electronic memory, and microcomputer memory devices and applications.

INTERFACING

DIGITAL INTERFACING WITH AN ANALOG WORLD

TAB No.1070

\$15.95

You've bought a computer, but now you can't make it do anything useful. This book will tell you how to convert real world quantities such as temperature, pressure, force and so on into binary representation.

MICROPROCESSOR INTERFACING HANDBOOK: A/D & D/A

\$15.95

A useful handbook for computerists interested in using their machines in linear applications. Topics discussed include voltage references, op-amps for data conversion, analogue switching and multiplexing and more.

SB22003: Z-80 MICROPROCESSOR ADVANCED INTERFACING WITH APPLICATIONS IN DATA COMMUNICATIONS

\$27.95

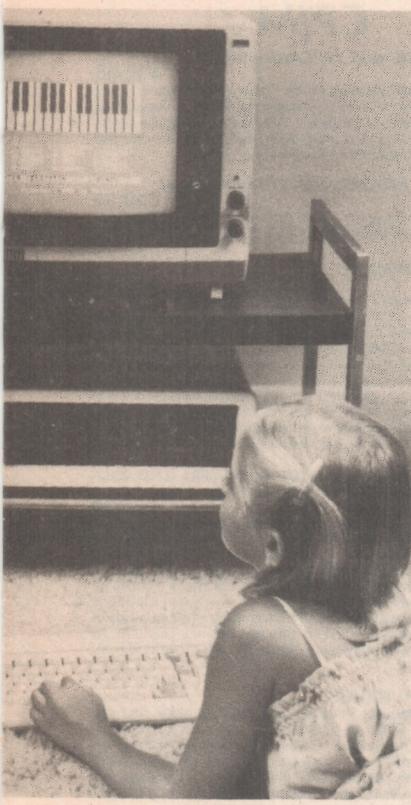
Helps you learn to exchange information and access data bases all over the world, using a system based on the Z-80, or almost any other 8- or 16-bit microprocessor. Includes a portable communications software package with complete instructions, plus many portable programs in BASIC and Z-80 assembly language.

SB21888: STD BUS INTERFACING

\$19.95

Now you can interface your STD system when there's no commercial interface card available! Gives you all the information and circuitry needed to use your STD bus computer system for controlling instruments or processes, or for acquiring data from an electrical device. Contains immediately usable assembly language software for Z-80, 8080/8085, 6502, and 6800-based microcomputers.

Computing — BASIC



BASIC

SB21836: ADVANCED 6052 INTERFACING \$18.50 Numerous examples of the 6502 and 6800 families, plus fundamental concepts help teach you design of interface circuits, understanding of LSI devices, and solutions to typical problems of ground noise, isolation, and transient and lightning damage. Contains many techniques valuable in the field of machine control.

BRAIN TICKLERS \$8.50 If the usual games such as Bug Stomp and Invaders From the Time Warp are starting to pale, then this is the book for you. The authors have put together dozens of stimulating puzzles to show you just how challenging computing can be.

BASIC COMPUTER PROGRAMS IN SCIENCE AND ENGINEERING
GILDER
HB08 \$17.50 Save time and money with this collection of 114 ready-to-run BASIC programs for the hobbyist and engineer. There are programs to do such statistical operations as means, standard deviation averages, curve-fitting, and interpolation. There are programs that design antennas, filters, attenuators, matching networks, plotting, and histogram programs.

GAME PLAYING WITH BASIC
SPENCER
HB10 \$16.95 The writing is nontechnical, allowing almost anyone to understand computerized game playing. The book includes the rules of each game, how each game works, illustrative flowcharts, diagrams, and the output produced by each program. The last chapter contains 26 games for reader solution.

PH179: BASIC PROGRAMS FOR HOME FINANCIAL MANAGEMENT
W. GOLDSMITH, Jr. \$16.95 This book is a 33 program home financial management system written in BASIC. It includes descriptions, listings, and sample runs and programs that are adaptable to TRS-80, Apple II, and other home computers.

SB2047: 26 BASIC PROGRAMS FOR YOUR MICRO \$16.95 Features 26 previously unpublished, simple-to-complex games you can run on almost any brand of microcomputer as long as you have enough RAM on board. Most take between 500 and 5000 bytes, with the highest taking 13K. Conversion charts that let you key them into your Radio Shack, TRS-80, Apple II, Timex/Sinclair 1000 (ZX81), Spectrum, Atari, or PET are included. Also features notes on program techniques and structures.

Tab1380: 30 COMPUTER PROGRAMS FOR THE HOMEOWNER IN BASIC \$15.95 Programs include a telephone timer, decor redesign, cheque-book program, a "coupon" organiser, menu planner and calorie planner.

Tab1533: GRAPHICS PROGRAM IN MICROSOFT BASIC

\$19.25
Generate computer art including mathematically defined art and animated graphics; draw still pictures — realistic and abstract; create an interactive space shuttle simulation; plot architectural and landscape drawings with both high and low resolution graphics; construct a 3-dimensional model of a function; plot 2-dimensional graphics, statistical relations, maps and diagrams. All these are written in Microsoft BASIC that is adaptable to just about any BASIC micro system.

SB21941: BASIC: FUNDAMENTAL CONCEPTS \$32.50 Introduces the BASIC language and compares its two major dialects by Microsoft and Digital Equipment Corporation. Teaches you the elements you need to convert programs from one BASIC dialect to another and helps you understand what happens when your computer tries to run a program in a dialect it can't understand. Third in Sam's computing series.

SB21841: BASIC PROGRAMMER'S NOTEBOOK
E. SAVAGE \$20.95 A valuable book that provides you with many timesaving BASIC subroutines and programming practices usually known only to highly experienced programmers. Also contains several debugged and easily modified program samples you can use.

SB21942: BASIC: ADVANCED CONCEPTS \$32.50 Last in Sams' special four-volume series on computers and computing. Uses BASIC as a tool to help you study program storage within the computer, explore the limitations of floating-point arithmetic, and examine number systems commonly used in computing. Complements and adds to the fundamental commands and concepts of No. 21941, the preceding volume.

THE MOST POPULAR SUBROUTINES IN BASIC
TAB No.1050 \$9.95 An understandable guide to BASIC subroutines which enables the reader to avoid tedium, economise on computer time and makes programs run faster. It is a practical rather than a theoretical manual.

PROGRAMMING IN BASIC FOR PERSONAL COMPUTERS
AB015 \$12.95

This book emphasizes the sort of analytical thinking that lets you use a specific tool — the BASIC language — to transform your own ideas into workable programs. The text is designed to help you to intelligently analyse and design a wide diversity of useful and interesting programs.

COMPUTER PROGRAMS IN BASIC
AB001 \$14.95

A catalogue of over 1,600 fully indexed BASIC computer programs with applications in Business, Math, Games and more. This book lists available software, what it does, where to get it, and how to adapt it to your machine.

BP86: AN INTRODUCTION TO BASIC PROGRAMMING TECHNIQUES \$7.75

S. DALY
This book is based on the author's own experience in learning BASIC and in helping others, mostly beginners, to program and understand the language. Also included are a program library containing various programs, that the author has actually written and run. These are for biorhythms, plotting a graph of Y against X, standard deviation, regression, generating a musical note sequence and a card game. The book is complemented by a number of appendices which include test questions and answers on each chapter and a glossary.

THE BASIC COOKBOOK.
TAB No.1055 \$9.95

BASIC is a surprisingly powerful language ... if you understand it completely. This book picks up where most manufacturers' documentation gives up. With it, any computer owner can develop programs to make the most out of his or her machine.

BASIC FROM THE GROUND UP
SIMON

HB15 \$18.95
Here's a BASIC text for high school students and hobbyists that explores computers and the BASIC language in a simple direct way, without relying on a heavy mathematical background on the reader's part. All the features of BASIC are included as well as some of the inside workings of a computer. The book covers one version of each of the BASIC statements and points out some of the variations, leaving readers well prepared to write programs in any version they encounter. A selection of exercises and six worked out problems round out the reader's experience. A glossary and a summary of BASIC statements are included at the end of the book for quick reference.

AHG2: UNDERSTANDING BASIC
PEDDICKORD \$3.95

BASIC is the universal microcomputer language and Understanding Basic teaches the novice to write programs right from the beginning. Emphasizes fundamental programming concepts and covers most features common to all popular versions of BASIC.

PH166: IMPLEMENTING BASICS: HOW BASICS WORK
W. & P. PAYNE \$19.95

Shows the reader how to write progressively more complex and advanced programs. Uses the stack-oriented method, tells how to develop table-driven software, and gives techniques for writing programs.

PH167: MAKING BASIC WORK FOR YOU

C. DeROSSI \$11.95
Learn to program with BASIC, one of the most useful computer languages around. Whether you are entering a computer-related field or simply have access to a computer and would like to use it more effectively, this book has everything you need to know.

PH168: PROGRAMMING IN BASIC FOR PERSONAL COMPUTERS

D. HEISERMAN \$12.95
This complete guide to BASIC computer programming, adaptable to the TRS-80, Apple II, and PET computers, covers a wide range of topics, from programmable video games to engineering and business programs.

SB22014: BASIC PROGRAMMING PRIMER

(2nd EDITION) \$24.95
Improved and expanded version of the 5-year Sams/Waite best seller, now featuring keywords, statements, and functions usable with any computer running a variation of Microsoft BASIC, including the IBM PC. Advanced BASIC coverage shows use of special statements, professional-style program coding, and more! New game-program listings include Rubik's Cube, Micospace Invaders, and Word Scrambler! New self-tests and answers help you learn and check your BASIC programming progress as you go! Still user-friendly to beginners and more advanced users, regardless of occupation.

HB125: INTRODUCTION TO TI BASIC

INMAN, ZAMORA, ALBRECHT \$18.75
Written by three of the foremost microcomputing programming experts in the country, this comprehensive work teaches you BASIC for use with the Texas Instruments Home Computer. The authors have carefully constructed this introduction so that you will soon be writing BASIC programs and exploiting all of the excellent features of the TI machine. Covers all the essential programming statements and machine features.

HB108: PROGRAMMING IN BASIC: A COMPLETE COURSE

McRITCHIE TBA
Suitable for use in both data processing and business courses, this introduction to BASIC provides foundation instruction in the use of the computer terminal, flowcharting, and programming concepts. Since it presupposes no previous experience with computers, McRitchie is accessible to a wide range of students with varying reading abilities. It teaches programming through hands-on student work, and reinforces basic principles through numerous examples and assignments.

HB101: I SPEAK BASIC TO MY TRS-80

HB102: I SPEAK BASIC TO MY APPLE
HB103: I SPEAK BASIC TO MY PET
JONES \$12.25
I SPEAK BASIC A field-tested computer literacy course that introduces students (and teachers) to BASIC language programming. NO PREVIOUS COMPUTER EXPERIENCE IS REQUIRED. This complete 15-session course is machine specific for Apple™, PET™, and TRS-80™ microcomputers and provides a complete understanding of the machine's operations and functions. The Student Text begins each lesson with learning objectives, followed by definitions of key terms, programming examples, in-class exercises, assignments, a summary, programming practices, and a quiz. Special annotations and suggestions in the Teacher's Manual aid in lesson planning and teaching methods, including answers to all quizzes and practices. Exam Set provided on spirit duplicating masters.

PH237: COMPUTER PROGRAMS IN BASIC

P. FRIEDMAN \$14.95
Covering six major discipline fields of Business/Finance, Games, Math, Science/Education, Personal Interest and Utility, this directory provides program reviews in over 173 categories and briefly describes what the program does, tells where it can be found, and lists the equipment needed to make the program run.

HB121: BASIC WITH STYLE: PROGRAMMING PROVERBS

NAGIN and LEDGARD \$12.80
Covers structured BASIC programming. Essential and surprisingly simple principles help BASIC programmers upgrade the quality and efficiency of their work. Each proverb is accompanied by discussion, explanations, and sample programs demonstrating the techniques.

HB117: BASIC BASIC: AN INTRODUCTION TO COMPUTER PROGRAMMING IN BASIC LANGUAGE, 2nd Ed.

COAN \$18.75
"... An excellent introduction to the use of BASIC... clearly written and well organized." COMPUTING REVIEWS. "It is a well written book... there are many good examples, complete with results." COMPUTER WORLD. Over 100 sample programs present the essential statements of BASIC. Each new language statement or capability is clearly explained at the time it is first used in a sample program. Every section is followed by practice problems; solutions to even-numbered problems appear in the text; the remainder in the separate Teacher's Guide.

HB118: ADVANCED BASIC: APPLICATIONS AND PROBLEMS

COAN \$18.50
"... a useful textbook to the student in a follow-up course, or the programmer acquiring BASIC as his second or third language... well above average." DATA PROCESSING DIGEST. Advanced techniques and applications, including coordinate geometry, area, sequences and series, polynomials, graphing, simulations, and games.

Computing — Languages & Operating Systems

ASSEMBLY LANGUAGES

Z-80 AND 8080 ASSEMBLY LANGUAGE PROGRAMMING

SPRACKLEN

HB05

Provides just about everything the applications programmer needs to know for Z-80 and 8080 processors. Programming techniques are presented along with the instructions. Exercises and answers included with each chapter.

HB126: Z-80 AND 8080 ASSEMBLY LANGUAGE

PROGRAMMING

SPRACKLEN

HB05

Provides just about everything the applications programmer needs to know for Z-80 and 8080 processors. Programming techniques are presented along with the instructions. Exercises and answers included with each chapter.

Tab1389: MACHINE AND ASSEMBLY LANGUAGE

PROGRAMMING

SPRACKLEN

HB12

This book assumes no prior programming knowledge and starts by explaining the advantages of ML. Several sample programs are included and each chapter ends with a quiz to check your understanding of that section.

SARGON: A COMPUTER CHESS PROGRAM

SPRACKLEN

HB12

"I must rate this chess program an excellent buy for anyone who loves the game." Kilobaud.

Here is the computer chess program that won first place in the first chess tournament at the 1978 West Coast Computer Faire. It is written in Z-80 assembly language, using the TDL macro assembler. It comes complete with block diagram and sample printouts.

FORTH

PH174: STARTING FORTH

L. BRODIE, FORTH, INC.

Here is valuable reading material for anyone interested in computer programming. "Starting FORTH" presents a clear and complete guide to FORTH — the revolutionary approach to computer programming.

SB21842: INTRODUCTION TO FORTH

K. KNECHT

Most complete book you can find on the MMS FORTH version of FORTH, and also a fundamental approach to programming in all versions of that language. Many programming examples are provided with direct comparisons to the Microsoft Level II BASIC version of the same program.

AHG17: UNDERSTANDING FORTH

REYMANN

An introduction and overview of this highly flexible programming language that is enjoying increasing interest.

SB22007: FORTH PROGRAMMING

L. SCANLON

Only book on the market that shows you the differences between FORTH-79 and fig-FORTH, and how to write or modify software using either dialect! Teaches you how to manipulate the stack and add new operations. Lists all FORTH commands. Includes more than 50 fast-acting, useful programs that will execute with little or no modification on any FORTH system.

FORTRAN

HB119: BASIC FORTRAN

COAN

This book will enable novice programmers to write FORTRAN programs immediately. The author has developed more readable programs by taking you step by step through the programming process. Short, complete programs are developed into longer, more comprehensive ones. Over 80 program examples are included.

HB123: FORTRAN WITH STYLE: PROGRAMMING PROVERBS

LEDGARD and CHMURA

This FORTRAN 76 style guide is intended for programmers who want to write carefully constructed, readable programs. Provides simple rules of style that enable the programmer to focus creatively on the deeper issues in programming.

AHG4: UNDERSTANDING FORTRAN

LUDWIG

FORTRAN is the most widely used language for engineering, scientific, and economic forecasting applications. Understanding FORTRAN acquaints the reader with this type of programming and covers the essential features of the language.

COBOL

Tab1398: COBOL

Cobol for Common Business Oriented Language is a high level language which has gained high acceptance as the language for expressing business data processing procedures in standard English. This title answers the questions you may have on purpose, use, environment, data and procedures.

AHG5: UNDERSTANDING COBOL

PEDDICORD

COBOL is the most commonly used language in large, business computers. Understanding COBOL is the ideal introduction for the beginning programmer or curious business manager.

PASCAL

PH169: THE FIRST BOOK OF JOSEF: AN INTRODUCTION TO COMPUTER PROGRAMMING USING PASCAL

I. TOMEK, ACADIA UNIVERSITY

Who said learning programming principles has to be dull? Now there's an entertaining and enjoyable way to learn! Readers learn and apply fundamental programming concepts by manipulating a simulated robot, Josef, via a simple programming language consisting of ordinary words governed by simple rules.

PH170: UCSD PASCAL: A CONSIDERATE APPROACH

D. PRICE

For anyone who wants to learn how to write programs in UCSD Pascal, this book offers the simplest, most effective way to write programs that are easy to read and easy to use. Written specifically for the novice programmer, it offers a solid, low-level introduction and focuses on basic, essential programming skills without going into unnecessary technical detail. Includes many simple programs.

PH171: UCSD PASCAL: A BEGINNER'S GUIDE TO PROGRAMMING MICROCOMPUTERS

J. HUME & R. HOLD

Everything beginners need to know for effective use of the "hot" new computer language, UCSD Pascal, is readily available in this exciting introduction to programming microcomputers.

PH172: THE UCSD PASCAL HANDBOOK

R. CLARK & S. KOEHLER

The UCSD Pascal Handbook contains language description organized especially for quick and easy reference. Built around example programs that demonstrate common and useful techniques.

PH173: PASCAL: A CONSIDERATE APPROACH

D. PRICE

Here is a straightforward introduction to the programming language Pascal. The emphasis is on "considerate programming," using an easy-to-follow approach that aims to ease the learning process by using simple programs.

AHG3: UNDERSTANDING PASCAL

LEDIN

PASCAL is available on most microcomputers and is one of the newest and most popular of all programming languages. By teaching this ideal "learning language," Understanding Pascal helps the novice develop good programming methods and understand the main programming structures.

HB120: PASCAL WITH STYLE: PROGRAMMING PROVERBS

LEDGARD, NAGIN, and HUERAS

A style guide specifically written to help Pascal users write more accurate, error-free programs the first time. Offers rules or guidelines that stress overall program organization and "Logical thinking." Special chapter on how to use the top-down approach with Pascal.

PASCAL PROGRAMMING FOR THE APPLE

AB008

A great book to upgrade your programming skills to the UCSD Pascal as implemented on the Apple II. Statements and techniques are discussed and there are many practical and ready to run programs.

PASCAL

TAB NO.1205

Aimed specifically at TRS-80 users, this book discusses how to load, use and write PASCAL programs. Graphic techniques are discussed and numerous programs are presented.

SPEAKING PASCAL

BOWEN

An excellent introduction to programming in the Pascal language! Written in clear, concise, non-mathematical language, the text requires no technical background or previous programming experience on the reader's behalf. Top-down structured analysis and key examples illustrate each new idea and the reader is encouraged to construct programs in an organized manner.

CP/M

PH175: CP/M ASSEMBLY PROGRAMMING

\$16.95

K. BARIER

This book is a self-teaching manual that will enable readers to learn the details of microcomputer hardware, its operating system, and assembly language programming. These three topics are integrated in a learn-by-doing environment of the most popular microcomputer operating system.

PH176: SYSTEM PROGRAMMING UNDER CP/M-80

\$20.95

L. HUGHES

How to use and program under the CP/M operating system. How to install and modify the CP/M o.s.

HB106: CP/M REVEALED

\$19.95

DENNON

This book is intended for CP/M users to improve their skills. It is a guide to the CP/M operating system: the console monitor (CCP), the system manager (BDOS), and the input/output driver package (CBIOS). In addition to providing a clear understanding of the data structure of the CP/M disk and other essentials to using CP/M effectively, this text fills many of the information gaps left by the Digital Research CP/M manuals. Coverage includes buying CP/M, booting up, logging in, changing memory size, mapping disk space, calling all programs, interfacing I/O devices, and more.

HB109: INSIDE CP/M: A GUIDE FOR USERS AND PROGRAMMERS, WITH CP/M-86 AND MP/M-2

\$32.95

CORTESI

This guide and reference manual for CP/M (an operating system for small computers) is divided into two sections. The Tutorial presents the basics of the management, use, and programming of a small computer and CP/M. In the Reference section, CP/M information is organized for quick access by programmers and users. The answer to any question about the day-to-day use of CP/M can be found in a few seconds in the reference section. Most of this text applies correctly to most CP/M systems; however, the book was developed on, and for, CP/M 2.2.

SB2179: CP/M® PRIMER

Helps microcomputer veterans and novices alike find the answers about CP/M in a complete, one-stop sourcebook that's a Sams best-seller! Gives you complete CP/M terminology, hardware and software concepts, startup details, and more for this popular 8080/8085/Z-80 operating system. Helps you begin using and working with CP/M immediately, and includes a list of compatible software, too.

PH15: A PROGRAMMER'S NOTEBOOK: UTILITIES FOR CP/M-80

\$46.50

D. CORTESI

This book/disk package, designed from the professional programmer's point of view, offers the nuts and bolts of programming in 8080 assembly language. With it, the user will be able to build an impressive software library that would cost a fortune if bought elsewhere. Book/Disk Package.

UNIX

PH177: USING THE UNIX SYSTEM

\$20.95

R. GAUTHIER

The book provides computer professionals with an excellent handbook that shows how to handle everything from specific commands to files to overall system design for new applications.

SB22028: UNIX PRIMER PLUS

\$27.95

This newest Sams/Waite Primer introduces you to the powerful UNIX operating system. Perfect for students, office workers, home-computer owners, new computer users and others learning about or starting on a UNIX-based system.

MISCELLANEOUS

PH14: COMAL HANDBOOK

\$39.00

L. LINDSAY

COMAL (COMMON ALGORITHMIC LANGUAGE) takes the simplicity of BASIC and the power and structure of Pascal and combines them into one language that's easy to learn and powerful to use. Includes 100 sample programs and procedures. Book/Disk Package.

AHG18: UNDERSTANDING LOGO

\$3.95

MCLEAN

LOGO is easy to learn, but capable of great sophistication. This Handy Guide is an introduction for the beginner and an overview for the advanced programmer.

HB124: MY MICRO SPEAKS BASEX (AND LOVES IT!)

\$13.45

WARME

An in-depth examination of BASEX, a versatile language for 8080 and Z-80 type microcomputers, which combines the best features of BASIC and executable machine code. The major advantage of BASEX is speed — programs run up to ten times faster than similar programs in BASIC.

AHG11: UNDERSTANDING APL

\$3.95

BRYSON

APL, rapidly growing in popularity, is one of the most concise computer languages, particularly well-suited to the efficient solution of mathematical and business problems. This Handy Guide is a concise introduction to the terms and functions of this language. For the beginning to advanced programmer.

Computing — Business

AHG12: UNDERSTANDING LISP

GLOESS

\$3.95

LISP is the most widely used language in the Artificial Intelligence community, an area of growing importance in the computer world, and is available on a growing number of personal computers. This Handy Guide is a detailed introduction to this language. For the reader with at least some programming experience.

BUSINESS (GENERAL)

PH180: 1983 CANADIAN BUSINESS GUIDE TO MICRO-COMPUTERS

K. DORRICOOTT

\$8.95

Written by the managing director of Deloitte, Haskins & Sells, a Canadian partnership of public accountants and other professional advisors to management, this book is one of the most complete comprehensive guides to microcomputers available. Starting with a general overview of microcomputers and their business applications, the author helps you assess your computer needs, compares and evaluates computer systems and application packages, and gives you tips on "doing it right". A must for anyone thinking of purchasing a microcomputer for business.

PH183: HOW TO BUY A BUSINESS COMPUTER AND GET IT RIGHT THE FIRST TIME

CROSS

\$20.95

246 pages

THE JOY OF MINIS AND MICROS: DATA PROCESSING WITH SMALL COMPUTERS

STEIN AND SHAPIRO

HB03

\$17.50

A collection of pieces covering technical and management aspects of the use of small computers for business or science. It emphasizes the use of common sense and good systems design for every computer project. Because a strong technical background is not necessary, the book is easy to read and understand. Considerable material is devoted to the question of what size computer should be used for a particular job, and how to choose the right machine for you.

SB2180: UNDERSTANDING AND BUYING A SMALL BUSINESS COMPUTER

\$13.95

A lively, practical guide intended primarily for small-business owners but equally usable by any businessperson considering purchase of a micro- or minicomputer for business use. Presented in a careful, nontechnical style and filled with examples, diagrams, and case studies of other business-users to help build your knowledge and confidence. Not a shopping guide. Helps you avoid hidden costs, spot reliable suppliers, and ask intelligent questions.

PH190: HOW TO BUY AN OFFICE COMPUTER OR WORD PROCESSOR

B. DONOHUE

\$11.95

A single-source of detailed instructions on how to find and contract the right computer or word processor, this book lays out a step-by-step procedure for selecting a system and for protecting one's self with a solid contract.

PH191: HOW TO SELECT YOUR SMALL COMPUTER ... WITHOUT FRUSTRATION

H. SEGAL & J. BERTS

\$19.95

Presents the latest tested and proven techniques to help the prospective computer buyer avoid the most common pitfalls that plague new users. Includes 18 worksheets leading the reader through each step of the way and "shopping lists" of features to look for in the most popular hardware and software.

PH182: THE ELECTRONIC OFFICE

N. FINN

\$16.95

Specific suggestions on how to implement office automation, as well as the factors to consider in computer contract negotiations, selection of hardware, database input and management, and 'ergonomics' of computer design.

PH184: MICROCOMPUTERS IN SMALL BUSINESS

R. RANDALL

\$11.95

Written specifically for the business-person with little or no experience with computers. Provides a basic, detailed introduction to the use of microcomputers in the small business environment.

PH185: A GUIDE FOR SELECTING COMPUTERS AND PROGRAMS FOR SMALL BUSINESS

P. ENOCKSON

\$19.95

An overview of all the aspects of the selection of a computer, including software and the installation of the entire system in any small business.

PH187: THE COMPLETE BOOK OF WORD PROCESSING AND BUSINESS GRAPHICS

W. SIKONOWIZ

\$19.95

Designed as an introduction to word processing and business graphic systems, this easy-to-understand guide features comparisons between dedicated machines and general purpose computers configured for these same applications.

PH188: A MANAGER'S GUIDE TO LOCAL NETWORKS

F. DERFLER, Jr. & W. STALLINGS

\$19.95

Informative, yet easy to understand, this book explains how business managers and corporate decision-makers can improve productivity with a better understanding of local network systems.



PH198: TAMING YOUR COMPUTER: A GUIDE FOR BUSINESS AND PROFESSIONAL PEOPLE

J. KANTER

\$11.95

"Taming Your Computer" will show you how to use your computer to reach peak efficiency in your daily functions as businessman or professional. Perfect for businessmen who want to streamline their production.

PH200: MICROCOMPUTERS FOR BUSINESS

SUMMER & LEVY, editors

\$10.95

Just about everything the small business operator or manager should know when considering the cost efficiency of microcomputer systems. Includes comparisons of various systems, cost evaluation, choosing the right system, much more. 40 case studies.

PH201: COMPUTER POWER FOR THE SMALL BUSINESS

C. SIPPL & F. DAHL

\$10.95

Explains how computers work in simple terms. Step-by-step instructions tell how to develop a plan for an individualized computer system.

PH202: HOW TO COMPUTERIZE YOUR SMALL BUSINESS

J. COHEN & C. MCKINNEY

\$10.95

A complete guide to selecting data processing equipment and services, this book shows how to plan a computer system tailored to the needs of any small business.

HOW TO PROFIT FROM YOUR PERSONAL COMPUTER: PROFESSIONAL, BUSINESS, AND HOME APPLICATIONS

LEWIS

\$18.95

Describes the uses of personal computers in common business applications, such as accounting, managing, inventory, sorting mailing lists, and many others. The discussion includes terms, notations, and techniques commonly used by programmers. A full glossary of terms.

PH192: HOW TO MANAGE YOUR SMALL COMPUTER ... WITHOUT FRUSTRATION

H. SEGAL & J. BERTS

\$19.95

Readers will learn how to guarantee a hassle-free installation; how to overcome the staff's computer phobia; how to hire, train and motivate DP personnel, and how to sell excess computer capacity for bonus profits.

PH193: DEVELOPING COMPUTER SOLUTIONS FOR YOUR BUSINESS PROBLEMS

H. PETERSON

\$19.95

A computer expert shows managers how to effectively implement, and evaluate automation alternatives. Written specifically for managers in both large and small business environments, it guides the reader in defining problems explaining them to data processing people, and finding the fastest and least expensive installation method.

PH194: MICROCOMPUTERS IN LARGE ORGANIZATIONS

T. MADRON

\$16.95

Here is the first — and only — book that discusses planned implementation of microcomputers in large organizations. Written specifically for business and data processing managers, it provides a complete description of software for the development of the Executive Workstation. Also included are implementation techniques on the IBM-PC and the Osborne 1.

PH195: SO YOU ARE THINKING ABOUT A SMALL BUSINESS COMPUTER

R. CANNING & N. LEEPER

\$14.95

Specially designed for the business person with little or no knowledge of computers, this book gives practical step-by-step guidelines for successfully selecting a small computer system and using it in daily office routines. It describes the benefits of having a computer system, how computers work, hardware and software characteristics, and how to use the services of a consultant.

PH189: THE COMPUTER IN YOUR LEGAL PRACTICE

M. MARCUS & L. BROWN

\$26.00

At last — here's the answer every lawyer has been waiting for! A complete, authoritative guide to computerizing a legal practice, this book will help readers better understand how computers work — and how to use them for increased efficiency and productivity in a business. Applications include law office management, accounting, finance, word processing, database and research, document control, records management, electronic mail, administration, and more.

PH186: MICROCOMPUTERS FOR ACCOUNTANTS

T. NEEDLEMAN

\$19.95

Written by a consultant who specializes in the financial application of microcomputers, this book shows accountants how to make their business more profitable by implementing microcomputers for better practice management, improved client support, and such new services as tax accounting, modelling, budgeting, and forecasting.

PH196: THE PHYSICIAN'S GUIDE TO DESKTOP COMPUTERS

M. SPOHR, M.D.

\$29.00

Designed for medical practitioners-doctors, dentists, nurses — who use or plan to use microcomputers in their practice. Written for the uninitiated computer user, the book covers the special capabilities of the desktop computer that make it valuable in a medical office/clinic.

USING MICROCOMPUTERS IN BUSINESS

VEIT

H804

\$15.95

An essential background briefing for any purchaser of microcomputer systems or software. In a fast-moving style, without the usual buzz words and technical jargon, Veit answers the most often asked questions.

See back page of catalogue for ordering details. No taxes apply to books.

Computing — Business

DATA BASE MANAGEMENT

PH199: DATA BASE SYSTEMS: DESIGN, IMPLEMENTATION AND MANAGEMENT

R. ROSS

\$29.00

Here's a practical, comprehensive resource that covers Data Base Management Systems. Examines CODASYL, inverted DBMs, mini-DBMS, the relationship model and physically-linked DBMS.

PH181: THE DATA BASE GUIDE

C. BENTON

\$26.00

Complete step-by-step book detailing the necessary elements for selecting, organizing, and implementing database systems for microcomputers. Presents material at a beginner's level yet thorough enough to aid the professional data processing person.

SB21875: MICROCOMPUTER DATA BASE MANAGEMENT

A practical guide for anyone who needs to control and access large amounts of data with a microcomputer. Complete tutorial shows routines you can use to write and implement your own data-base programs. Also explains step-by-step operation of WHATSIT, SELECTOR, and PROFILE, just 3 of many data-base packages on the market, and evaluates their performance. If you know the fundamentals of BASIC programming, you'll do fine with this book.

AHG10: UNDERSTANDING DATA BASE MANAGEMENT

FREILING

\$3.95

This Handy Guide explains how data bases are created, maintained and utilized, and surveys the latest techniques, providing an easy overview for business managers and programmers alike.

PH230: EVERYMAN'S DATABASE PRIMER

BYERS

\$19.95

Photo of a person's hands typing on a keyboard.



BUSINESS SOFTWARE

PH203: THE POWER OF MULTILINK™ MANAGEMENT INFORMATION SOURCE

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Covers: Accounts receivable, invoicing, cost recovery, production scheduling, estimating, checkbook, and engineering problem solving, accounts payable, payroll, monthly sales report, inventory and financial forecast.

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Residential income property analysis, amortization schedule, condominium conversion or tract home development cash flow analysis, project operating case flow analysis, property tenant income revenue calculations, construction disbursements, construction loan draw, project cost analysis, cash flow analysis.

PH205: THE POWER OF VISIPILOT — VISICALC — VISIFILE: MANAGEMENT INFORMATION SOURCE

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Line graphs, Bar graphs, Area graph, Pie and Hi-Lo overlaying plots, storage management, VisiCalc data plotted, VisiFile data plotted.

PH206: dBASE II USER'S GUIDE

A. GREEN

\$38.00

This instructional handbook for novices and experienced users alike presents a simple, highly effective approach to learning how to use this powerful software program available for microcomputers.

PH207: SUPERCALC! THE BOOK

D. BEIL

\$22.95

This practical programming guide is designed to help users of a SuperCalc system discover its real power! It teaches readers how to design the right "model" so that they can examine every step of their business operation and includes practice problems to help along the way.

PH208: THE VISICALC APPLICATIONS BOOK

J. GRUSHOW

\$22.95

Designed for both the novice and advanced VisiCalc user, this practical guide explains WHY VisiCalc should be used as well as HOW to use it in six key business areas: credit control, financial statement analysis, forecasting, budgeting, cost management, and portfolio management.

PH209: THE POWER OF VISICALC

R. WILLIAMS & B. TAYLOR

\$12.95

A must for anyone who owns — or is thinking about getting — a microcomputer, this instructional handbook presents a simple and effective approach to learning how to use the most powerful software program available for personal size computers. It demonstrates the use of VISICALC features through specific examples in a wide range of applications.

PH210: THE POWER OF SUPERCALC

R. WILLIAMS & B. TAYLOR

\$12.95

Here is the first book that demonstrates the use of SUPERCALC features through specific application examples. Written for business owners, accountants, teachers, students, and homeowners, it presents several easy-to-follow exercises for developing and expanding problem-solving skills with SUPERCALC.

AHG8: HOW TO USE VISICALC/SUPERCALC

SHRUM

\$3.95

A step-by-step, detailed guide to the two best-selling software for personal computers, used to make budgeting and forecasting easy. This Handy Guide clearly and simply explains all VisiCalc/SuperCalc functions and helps the reader creatively solve problems. For the complete novice.

AHG10: BASIC COMPUTER PROGRAMS FOR BUSINESS (Vol. 2)

STERNBERG

\$19.95

A must for small businesses and entrepreneurs using micros. Over 60 practical business applications, each documented with a description of its functions and operation, a listing in BASIC, a symbol table, sample data, and one or more samples.

PH197: SIMPLE: BASIC PROGRAMS FOR BUSINESS APPLICATION

J. ALONSO

\$19.95

This book includes BASIC programs that even a new user can use with as little as 3 minutes of instruction! And for experienced users, these programs can be easily modified to better suit particular needs. Covers a wide range of statistical, business, and mathematical techniques.

BASIC COMPUTER PROGRAMS FOR BUSINESS: STERNBERG (Vol. 1)

HB13

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A must for small businesses utilizing micros as well as for entrepreneurs, volume provides a wealth of practical business applications. Each program is documented with a description of its functions and operation, a listing in BASIC, a symbol table, sample data, and one or more samples.

WORD PROCESSING

PH211: WORD PROCESSORS AND INFORMATION PROCESSING

\$15.95

D. POYNTER

A clear, readable word processing book that provides business and lay people with the means to effectively evaluate word processing equipment and choose the appropriate machine for their specific needs.

PH212: CHOOSING A WORD PROCESSOR

\$16.95

P. GOOD

Provides a head-to-head comparison of 157 features of the 21 leading word processing systems, plus extensive checklists to help pick the system that is most flexible and most cost efficient for the work that must be done.

PH213: WORD PROCESSING SIMPLIFIED AND SELF-TAUGHT

\$6.95

J. CHRISTENSEN

Illustrates how word processing functions in a typical office environment and explains the basic components and applications that all potential users need to know, whether business or personal use.

PH214: THE WORD PROCESSING HANDBOOK

\$11.95

R. STULTZ

Convenient and easy to use, this handbook is designed for the business manager responsible for the operation of high technology word processing systems. It is written in a style which cuts through the usual technical doubletalk to give the reader a better understanding of word processing systems — what they are, what they do, and which one to select, as well as the bottom line cost of owning and operating a system.

SB21929: WORD PROCESSING FOR SMALL BUSINESSES

\$16.95

Tells you about doing practical word processing on a personal computer, how word-processing software works, what benefits you can expect from W/P, and what you should avoid. Compares micro- and minicomputer W/P systems, discusses W/P software and its documentation, points out the effects of different hardware designs, and presents details for more than 50 word-processing systems, including applicable hardware and W/P software.

GENERAL

DESIGNING MICROCOMPUTER SYSTEMS

\$17.50

POOCH AND CHATTERBY

This book provides both hobbyists and electronic engineers with the background information necessary to build microcomputer systems. It discusses the hardware aspects of microcomputer systems. Timing devices are provided to explain sequences of operations in detail. Then, the book goes on to describe three of the most popular microcomputer families: the Intel 8080, Zilog Z-80, and Motorola 6800. Also covered are designs of interfaces for peripheral devices, and information on building microcomputer systems from kits.

S-100 BUS HANDBOOK

\$25.50

HB19: BURSKY

Here is a comprehensive book that exclusively discusses S-100 bus computer systems and how they are organized. The book covers computer fundamentals, basic electronics, and the parts of the computer. Individual chapters discuss the CPU, memory, input/output, bulk-memory devices, and specialized peripheral controllers. It explains all the operating details of commonly available S-100 systems. Schematic drawings.

THE BASIC CONVERSIONS HANDBOOK FOR APPLE, TRS-80, AND PET USERS

\$12.95

BRAIN BANK

This is a complete guide to converting Apple II and PET programs to TRS-80, TRS-80 and PET programs to Apple II, TRS-80 and Apple II programs to PET. Equivalent commands are listed for TRS-80 BASIC (Model I, Level II), Applesoft BASIC and PET BASIC, as well as variations for the TRS-80 Model III and Apple Integer BASIC.

AHG6: UNDERSTANDING ARTIFICIAL INTELLIGENCE GLOESS

\$3.95

This Handy Guide surveys current developments and applications of artificial intelligence and explains them in easy-to-understand language. Readers need not know programming.

Computing — General

HB116: THE BASIC CONVERSIONS HANDBOOK FOR APPLE™, TRS-80™, and PET™ USERS

BRAIN BANK \$12.95
A complete guide to converting Apple II and PET programs to TRS-80, TRS-80 and PET programs to Apple II, and TRS-80 and Apple II programs to PET. Equivalent commands are listed for TRS-80 Model I, Level II, Applesoft BASIC, and PET BASIC, as well as variations for TRS-80 Model III and Apple Integer BASIC. Also describes variations in graphic's capabilities.

SB21927: MICROCOMPUTER MATH

W. BARDEN \$16.95
A step-by-step introduction to binary, octal, and hexadecimal numbers, and arithmetic operations on all types of microcomputers. Excellent for serious BASIC beginners and intermediates as well as assembly-language programmers. Treats addition and subtraction of binary, multiple-precision and floating-point operations, fractions and scaling, flag bits, and more. Many practical examples and self-tests.

PH240: THE COMPUTER COOKBOOK™

W. BATES \$16.95
A guidebook to putting together microcomputer systems from various components available on the market. Offering factual and specific information (not a lot of jargon), it explains how to integrate assorted "ingredients" into finished systems.

HOW TO TROUBLESHOOT AND REPAIR MICROCOMPUTERS

AB013 \$12.95
Learn how to find the cause of a problem or malfunction in the central or peripheral unit of any microcomputer and then repair it. The tips and techniques in this guide can be applied to any equipment that uses the microprocessor as the primary control element.

TROUBLESHOOTING MICROPROCESSORS AND DIGITAL LOGIC

TAB No.1183 \$15.95
The influence of digital techniques on commercial and home equipment is enormous and increasing yearly. This book discusses digital theory and looks at how to service Video Cassette Recorders, microprocessors and more.

HOW TO DEBUG YOUR PERSONAL COMPUTER

AB012 \$12.95
When you feel like reaching for a sledge hammer to reduce your computer to fiberglass and epoxy dust, don't. Reach for this book instead and learn all about program bug tracking, recognition and elimination techniques.

PH178: INCOME FROM YOUR HOME COMPUTER

E. LIAS \$16.95
Presents 30 ways to earn income with a home microcomputer. One third of the innovative ideas are applicable to the novice, and much of the text appeals to game players as well as skilled system designers. Includes names and addresses of software agents, microcomputer manufacturers, journals, user clubs, microcomputer directories, workshop resources, and publishers who buy software.

HOW TO PROGRAM YOUR PROGRAMMABLE CALCULATOR

AB006 \$11.95
Calculator programming, by its very nature, often is an obstacle to effective use. This book endeavours to show how to use a programmable calculator to its full capabilities. The TI 57 and the HP 33E calculators are discussed although the principles extend to similar models.

BP33: ELECTRONIC CALCULATOR USERS HANDBOOK

M.H. BABANI, B.Sc.(Eng.) \$3.75
An invaluable book for all calculator users whatever their age or occupation, or whether they have the simplest or most sophisticated of calculators. Presents formulae, data, methods of calculation, conversion factors, etc., with the calculator user especially in mind, often illustrated with simple examples. Includes the way to calculate using only a simple four function calculator: Trigonometric Functions (Sin, Cos, Tan); Hyperbolic Functions (Sinh, Cosh, Tanh); Logarithms, Square Roots and Powers.

SB21960: COMPUTER PROGRAMS FOR MACHINE DESIGN

\$3.95
Aids mechanical and material engineers, machinists, technicians, and students in solving the day-to-day problems that come up in their involvement with various facets of machine technology. Organized by major subject area in a logical, problem-solving order that features a statement of the problem, the formula used for solution, and a working example. You can manipulate data repeatedly to observe specific design variables. Programs are in BASIC.

AHG16: UNDERSTANDING DATA COMMUNICATIONS

BUCKWALTER \$3.95
A non-technical introduction to all aspects of communications between computers. Emphasizes the practical requirements of electronic mail, networking, and shared systems.

SB21896: INTRODUCTION TO ELECTRONIC SPEECH SYNTHESIS

N. SCLATER \$12.95
Helps you understand how a human "voice" is electronically created, explains the three current digital synthesis technologies used, and tells you what you can expect in speech synthesis as it relates to data rate and the cost of memory devices. Also evaluates complexity and cost of commercial voice-synthesis subsystems.

PH220: MICROCOMPUTER DATA COMMUNICATIONS SYSTEMS

F. DERFLER, Jr. \$16.95
This guide explains microcomputers as data communications terminals and electronic message systems. Covers TRS-80, Apple II, Heath H-89, and other systems.

PH221: CAI SOURCEBOOK

R. BURKE \$15.95
CAI stands for Computer Assisted Instruction, and this step-by-step introduction to the systematic development and validation of CAI includes a complete set of forms and procedures for implementing the systems approach to computer assisted instruction.

PH222: THE ABC'S OF MICROCOMPUTERS: A COMPUTER LITERACY PRIMER

L. CHRISTIE & J. CURRY, Jr. \$10.95
An invaluable collection of informative discussions on applications, equipment, programming, and operations of microcomputers. Focuses on those topics essential for the novice to know, and defines all technical terms as they appear.

PH223: COMPUTERS AND DATA PROCESSING SIMPLIFIED AND SELF-TAUGHT

R. STRACKBEIN & D. STRACKBEIN \$6.95
Shows in non-technical language how computers work, what their applications are, and how these applications are being utilized in the everyday world.

PH224: SIMPLIFIED GUIDE TO MICROCOMPUTERS

W. BOCCINO \$26.00
Features 10 model programs (worth hundreds of dollars) for business and personal use, a special glossary of microcomputer terms, and dozens of photos, diagrams, charts and checklists.

PH225: MICROCOMPUTERS GRAPHICS

D. HEARN & M. BAKER \$24.95
Provides the reader with a solid grasp of the graphic capabilities of microcomputers and the variety of uses to which they can be put. Graphics methods are illustrated with programs written in BASIC.

PH226: COMPUTER ANATOMY FOR BEGINNERS

M. OUVERSON \$14.95
Specifically written for the thousands of readers who simply want to know what the microcomputer revolution is all about and how it might affect, or even benefit them.

PH227: SOFTWARE ENGINEERING FOR SMALL COMPUTERS: A PROGRAMMER'S COMPANION

R.B. COATS \$22.95
For more advanced programmers who want to extend their skills beyond simple programming, this reference guide takes the reader from analysis to design, through construction and implementation.

PH228: PROGRAMMING A PERSONAL COMPUTER

P. HANSEN \$24.95
Describes a software system powerful enough to support the development of new operating systems, compilers, and text processing programs on a small, personal computer, yet is simple enough to be studied in detail at all levels of programming. The software system is written in the programming language Edison — a Pascal-like language that supports program modularity and concurrent execution on microprocessor. 11 line illustrations.

PH229: VIDEOTEXT: THE MESSAGE IN THE MEDIUM

P. STORFER \$19.95
Here is a complete, authoritative guide to videotext services. It explores their potential impact on advertising, personal computer use, banking and financial services, libraries, publishing, and broadcasting.

PH231: MICROS AND MODEMS

J. NILLES \$30.00

MICROCOMPUTERS AND THE 3 R'S

DOERR
HB09 \$15.95
This book educates educators on the various ways computers, especially microcomputers, can be used in the classroom. It describes microcomputers, how to organize a computer-based program, the five instructional application types (with examples from subjects such as the hard sciences, life sciences, English, history, and government), and resources listings of today's products. The book includes preprogrammed examples to start up a microcomputer program; while chapters on resources and products direct the reader to useful additional information. All programs are written in the BASIC language.

PH232: MATHEMATICAL PROBLEM SOLVING WITH THE MICROCOMPUTER: PROJECTS TO INCREASE YOUR BASIC PROGRAMMING SKILL

S. SNOVER & M. SPIKELL \$11.95
Whether it is for educational or recreational purposes, this collection of programs is written with BASIC instructions that are general enough to work on virtually every computer that uses BASIC language.

PH233: A 60-MINUTE GUIDE TO MICROCOMPUTERS

L. HOLLERBACH \$9.95
Specifically designed for beginners who want a quick course in personal and business computing, this book provides a solid, low-level introduction to microcomputers. It gives a lucid presentation of microcomputer use in both business and personal spheres and clarifies all the technical buzz words in a simple and entertaining fashion.

PH234: EXPLORING THE WORLD OF THE PERSONAL COMPUTER

J. NILLES \$16.95
"Exploring the World of the Personal Computer" takes this technology to the individual and societal level, examining the positive and negative aspects of the present and future widespread use of low cost microcomputers.

PH235: BIG THINGS FROM LITTLE COMPUTERS

D. PETERSON \$16.95
Written in a non-technical style, this book will appeal to the increasing number of people interested in personal computing — whether or not they have a professional background in the area. Computer enthusiasts will learn about such topics as how a computer works, and what can actually be done with a computer.

PH236: THE PRENTICE-HALL CONCISE BOOK OF COMPUTERS

M. FRANK \$13.95
"The Prentice-Hall Concise Book of Computers" explains clearly what computers are, how they operate, and the sort of work they perform. It examines every aspect of this fascinating subject, from the simplest type of machine to the most sophisticated, which are astoundingly fast, and shows that, far from being the mystery that most people consider them, computers are useful, comprehensible tools of benefit to all of us, whether we use one directly or not. Over 150 illustrations in colour and black and white.

CONSTRUCTIONAL

Tab1491: 101 PROJECTS FOR THE Z80

\$29.95
Gives you hands-on experience in interfacing fundamentals plus a thorough grounding in creative programming. There are hardware and software applications and several that combine both.

Tab1449: COMPUTER PERIPHERALS YOU CAN BUILD

\$20.95
Shows you how to build A/D and D/A converters, cassette interfaces, light pens, disk drives, AC and DC control mechanisms, music boards and much more.

HOW TO BUILD YOUR OWN WORKING MICROCOMPUTER

TAB No.1200 \$15.95
An excellent reference or how-to manual on building your own microcomputer. All aspects of hardware and software are developed as well as many practical circuits.

BP78: PRACTICAL COMPUTER EXPERIMENTS

E.A. PARR, B.Sc., C.Eng., M.I.E.E. \$6.80
Curiously most published material on the microprocessor tends to be of two sorts, the first treats the microprocessor as a black box and deals at length with programming and using the "beast". The second type of book deals with the social impact. None of these books deal with the background to the chip, and this is a shame as the basic ideas are both interesting and simple.

This book aims to fill in the background to the microprocessor by constructing typical computer circuits in discrete logic and it is hoped that this will form a useful introduction to devices such as adders, memories, etc. as well as a general source book of logic circuits.

KIDS

PH215: KIDS AND THE APPLE

E. CARLSON & DATAMOST \$26.00
Written primarily for 10 to 14 year-olds, this book helps kids (as well as parents and teachers) become pros at writing Applesoft Basic Programs for home computers. Through a series of 33 sequential, easy-to-follow lessons, examples and exercises, learn how to program Apple computers, to play board games, word games, action games, store and recall personal data, debug, edit, create graphics, even create a program.

PH216: KIDS AND THE VIC

E. CARSON & DATAMOST \$26.00
Written primarily to 10 to 14 year-olds plus parents and teachers, this new guide offers sequential, easy-to-follow lessons, examples, and exercises that illustrate how to program the VIC personal computer to play board games, word games, and action games, store and recall personal data, debug, edit, create graphics, and more!

PH217: BASIC COMPUTER PROGRAMMING FOR KIDS

P. CASSIDY & J. CLOSE \$15.95
Fully illustrated with photographs and drawings, this book teaches the reader the history of computers and computing and gently introduces binary mathematics and the basic theory of how computers work. Written in an easy, conversational tone.

PH218: COMPUTER GRAPHICS AND GAMES FOR KIDS: APPLE II

P. CASSIDY & J. CLOSE \$15.95
An entertaining, educational approach to teaching kids to use computers, this book explains the principles of programming through computer graphics and games. Readers are given a series of simple, easy-to-follow graphics problems to solve for quick, effective mastery over the material and over the machine. Readers are then encouraged to create and modify their own computer games.

PH219: BASICALLY SPEAKING: A YOUNG PERSON'S GUIDE TO COMPUTING

COHEN \$16.95
See back page of catalogue for ordering details. No taxes apply to books.

Computing Systems

APPLE

ARCP3: 101 APPLE COMPUTER PROGRAMMING TIPS & TRICKS

F. WHITE \$12.50
Practical ready-to-type-and-run software. 96 pages.

HB105: BASIC APPLE™ BASIC COAN \$18.75

A complete guide to Applesoft BASIC. Takes you from beginning concepts, such as entering data and obtaining output and planning programs, to more advanced topics, such as numeric and string arrays and sequential and random-access files. Alternate techniques for programming in Apple Integer BASIC are also covered. Discusses Lo-Res and Hi-Res graphics.

HB107: GRAPHICS COOKBOOK FOR THE APPLE WADSWORTH \$14.45

Learn how to use your Apple II to "paint" shapes, objects, and letters in low-resolution graphics. The author provides a library of microcomputer graphics including such multicolored illustrations as robots and flying saucers, trees, sailboats, and colourful picture backgrounds. Contains complete annotated Applesoft BASIC programs to draw all the pictures described in the book as well as suggestions for improving programming techniques.

HB110: APPLE PASCAL: A PROGRAMMING GUIDE TUCKER \$26.95

This class-tested text offers a complete, self-contained introduction to programming using the Apple UCSD Pascal language. Tucker's accessible coverage introduces Pascal via a subset language (Eight Statement Pascal) to orient and involve students from the start. He teaches Apple editor and filer commands early and provides extensive examples, exercises, and lab problems keyed to a variety of fields from business to science. Structured programming is used throughout.

SB21959: THE APPLE® II CIRCUIT DESCRIPTION \$32.50

Provides you with a detailed circuit description of the Apple II motherboard, including the keyboard and power supply. Comes complete with timing diagrams for major signals and discussion of differences between the various revisions. Good for technicians, serious hobbyists, and others with some knowledge of digital hardware.

SB21889: INTERMEDIATE LEVEL APPLE® II HANDBOOK D. HEISERMAN \$23.95

Hands-on aid for exploring the entire internal firmware of your Apple II and finding out what you can accomplish with its 6502 microprocessor through machine- and assembly-language programming. Good introduction if you're ready to move out of BASIC but don't want to buy more hardware.

PHS1: PASCAL FOR THE APPLE IAIN MacCALLUM \$33.80

A step-by-step introduction to Pascal for Apple II and Apple II Plus users. The package of text and software diskette provides readers with worthwhile and interesting programs which can be run immediately and the results studied. Includes over 200 exercises with full solutions. Book/Disk Package.

PHS2: APPLE GRAPHICS GAMES PAUL COLLETTA \$33.00

Contains 10 arcade-style games written especially for the Apple II, including Spider, Piano, Pairs and Poker, as well as education, math, and designing games. Book/Disk Package.

PHS17: MULTIPLOY (APPLE II) P. COLETTA \$29.95

"Arithmetic can be fun?" "YES!" Simply slip MULTIPLOY into an Apple II and you're under attack; math problems come down the screen and unless you answer them correctly — WHAM! — you're a goner. Four math operations — three levels of play. Software Package.

PHS18: WORDWORX (APPLE II) \$60.00

WordWorx consists of two fantastic word games — "Myspeller" and "Sentence Builder." Each game can be played competitively or solo, and at a variety of difficulty levels. They're both challenging learning tools for kids and brain-teasing fun for adults. Software Package.

Tab1513: APPLE II BASIC \$22.95

Does far more than teach you BASIC vocabulary. Includes a library of subroutines that form the cornerstone of this unique programming approach. Other topics include formatting hard copy, PEEKs, POKEs, CALLs and other output techniques, sequential text files; random access files; sorting routines; number crunching, etc.

SB21846: ENHANCING YOUR APPLE® II — VOLUME 1 D. LANCASTER \$25.00

Who but Mother Nature or Don Lancaster could successfully enhance an Apple? YOU can, with help from Volume 1 in Don's newest series for Sams. Among other things, you'll learn (1) to mix text, LORES, and HIRES together anywhere on the screen in any combination, (2) how to make a one-wire modification that will open up whole new worlds of 3-D graphics and other special effects, plus (3) a fast and easy way to tear apart and understand somebody else's machine-language program. Other goodies abound!

SB21863: CIRCUIT DESIGN PROGRAMS FOR THE APPLE® II \$22.50

A series of ready-to-run Applesoft programs that show you "what happens if" and "what's needed when" as they apply to periodic waveform, rms and average values, the solution of simultaneous equations, and more. Ideal for electronics design engineers and others faced with solving problems related to plotting and simple verification of experimental data.

SB21862: APPLE® INTERFACING \$15.50

Describes the internal Apple II control signals available for I/O interfacing and shows you how to use them with Applesoft BASIC to control devices and communicate with other computers, modems, serial printers, and more. Furnishes real, tested interfacing circuits that work, plus complete breadboarding to help you check out your own interfacing ideas.

SB21864: MOSTLY BASIC: APPLICATIONS FOR YOUR APPLE® II, BOOK 2 \$18.50

A second goldmine of fascinating BASIC programs, including two dungeons that test your math and history abilities and another one that's strictly for fun, eleven household programs, a monthly savings plan and six more on money or investment, two that test your level of ESP, and more — 32 in all! Excellent for beginning or advanced computerists.

SB21911: APPLE® FORTRAN \$20.95

Gives you full programming details on Apple FORTRAN 77, plus an introduction to Apple's Pascal language card, the use of FORTRAN on single or multiple disk drives, and several programs in FORTRAN that you can use immediately! Excellent for any Apple II owner who uses or would like to use FORTRAN, including beginning or advanced programmers, businessmen, and other professionals.

SB21894: APPLE® II ASSEMBLY LANGUAGE \$22.50

Specifically directed to the beginning programmer who has no prior experience with assembly language. Shows you how to use the 3-character, 56-word assembly language vocabulary of Apple's 6502 microprocessor to create powerful programs that bring you inside the brain of the Apple itself! Can be read by Apple owners in all walks of life simply as a learning experience or used in a conscientious assembly language study program.

SB22026: POLISHING YOUR APPLE® \$6.95

Clearly written, highly practical, concise assembly of all procedures needed for writing, disk-filing, and printing programs with an Apple II. Positively ends your searchs through endless manuals to find the routine you need! Should be in the hands of every new Apple user, regardless of experience level. Ideal for Apple classrooms too!

APPLE MACHINE LANGUAGE PROGRAMMING ABO09 \$19.95

The best way to learn machine language programming the Apple II in no time at all. The book combines colour, graphics, and sound generation together with clear cut demonstrations to help the user learn quickly and effectively.

PH101: ELEMENTARY APPLE W. Sanders & Datamost (1983) \$19.95

For new owners of the Apple Personal Computer, this entertaining guide is like having a friendly, cheerful teacher at the user's side — clearly explaining everything the beginner wants to know — and carefully leading him from point to point.

PH102: HOW TO WRITE AN APPLE PROGRAM E. FAULK & DATAMOST (1983) \$19.95

Proven-successful, simple techniques for programming the Apple personal computer in BASIC. The authors develop an actual program with the reader to provide a simple set of examples for the topics discussed.

PH103: PROGRAMMING THE APPLE: A STRUCTURED APPROACH J. CAMPBELL & L. ZIMMERMAN (1983) \$26.00

Offers a unique, structured approach to programming by presenting the BASIC language as a problem-solving tool. This book unravels the intricacies of programming — where to start, what to do, and how to write code more effectively.

PH104: ACCOUNTANT'S BASIC PROGRAMMING FOR THE APPLE II A. PARKER & J. STEWART (1983) \$19.95

Shows the reader how to program the Apple II to perform a variety of accounting functions, such as payroll, accounts payable, accounts receivable, tax, inventory, customer statements, and more.

PH105: APPLE COMPUTER GRAPHICS K. WILLIAMS (1983) \$26.00

Offers a complete, clear, state-of-the-art explanation of the graphic capabilities of the Apple II — and how to use them. Requires only a knowledge of BASIC; no assembler or machine language skills are required.

PH106: PROGRAMMING TIPS AND TECHNIQUES FOR THE APPLE II J. CAMPBELL (1983) \$22.95

An advanced exploration of the intricacies of structures programming. Further develops the skills necessary to solve programming problems. Special chapter on sound and graphics which discusses both high and low resolution graphics for the Apple II.

PH107: APPLE LOGO PRIMER G. BITTER & N. WATSON

\$16.95 A pictorial starter book that will make LOGO easy for anyone. Includes easy to follow examples and reference tables. Also included is a workshop outline for teachers and leaders who want to train others.

PH108: THE ACADEMIC APPLE R. MOWE (1983) \$14.95

Written for parents and teachers using the Apple II in the education process. Topics discussed include choosing commercial software, educational software, sample programs and teaching BASIC programming.

PH109: APPLE II PROGRAMMER'S HANDBOOK R. VILE (1982) \$22.95

Written specifically for the beginning programmer, here's a hands-on approach to programming. It includes tips and techniques for Integer BASIC, APPLESOFT BASIC, APPLE PASCAL, and 6502 Assembly Language on the APPLE II computer and gives complete programs — each tested and ready to use — for applications in graphics, education, utilities, languages, and entertainment.

PH110: THE APPLE PERSONAL COMPUTER FOR BEGINNERS S. DUNN & VALERIE MORGAN (1982) \$17.95

Written for those who have no experience in computers, this informative book teaches the fundamentals of BASIC and computing, using the Apple computer system.

PH111: BASIC FOR THE APPLE II L. GOLDSTEIN & M. GOLDSTEIN (1982) \$19.95

A new start-to-finish "hands-on" guide covering BASIC programming and practical real-life applications for the Apple II. Includes detailed information for setting up and using a computer system with discussions of such diverse applications as games, graphics, file management, and word processing.

PH112: APPLE FILES D. MILLER (1982) \$19.95

Aimed at the Apple user who is familiar with BASIC and wants to set up or expand files for home or business. Includes programs for mailing lists, a medical records system, home inventory and more.

PH113: THE VISICALC BOOK: APPLE EDITION D. BEIL (1982) \$19.95

A helpful and informative guide to using VISICALC, the "electronic spreadsheet" software program that's perfect for pricing/costing estimates, profit/loss, forecasting and hundreds of other business "what if" questions. Specifically written for Apple computer systems.

PH114: APPLE BASIC R. HASKELL \$16.95

Gives the beginner a thorough introduction to BASIC programming using the Apple computer. Includes home financial management, games, graphics, math programs and more. Appropriate for classroom use or self instruction.

PH115: APPLE BASIC FOR BUSINESS/FOR THE APPLE II A. PARKER & J. STEWART \$20.95

Shows how to use BASIC and the Apple II system to solve practical business problems quickly and efficiently. Contains flowcharts and sample programs.

PH116: APPLE MACHINE LANGUAGE D. & K. INMAN \$19.95

Allows Apple users to move from BASIC to the more powerful machine language programming quickly and easily.

PH117: PASCAL PROGRAMMING FOR THE APPLE T. LEWIS \$19.95

This manual provides easy-to-follow instructions on programming with Pascal. The author begins with the basics: the shell of a Pascal program, type casting the data, simple sequences, choice and looping. He then moves on to subjects of greater complexity and challenge.

PH118: INTERFACE PROJECTS FOR THE APPLE II R. HALLIGREN \$16.95

Provides Apple II users with a series of interface projects that are easily built and enable the user to discover the computer's capabilities through project construction.

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Computing Systems

IBM P.C.

PH150: IBM BASIC

D. PAYNE, Ph.D.

Focusing on developing the proper attitudes, techniques and skills for good problem-solving, the book's approach facilitates the reader's understanding of computing by presenting procedural reasoning problems accompanied by programs written in BASIC.

PH151: IBM PC ASSEMBLY LANGUAGE PROGRAMMING

L. SCANLON

\$20.95

An introduction to the fundamental principles of microprocessors, numbering systems, and assemblers for those with little or no experience with microcomputers or assembly language programming. Focuses on a "real" assembler that will probably become the de facto standard of the IBM PC.

PH152: PASCAL PROGRAMMING FOR THE IBM PC

K. BOWYER & S. TOMBOLIAN

\$23.95

Here's the "first of its kind" book that brings Pascal programming and the IBM Personal Computer together. Working interactively, this book is perfect for users who want to move beyond BASIC but don't know where to start. It emphasizes graphics and sound applications with reference to both the IBM Personal Computer and UCSD p-system Pascal.

PH153: SCIENCE AND ENGINEERING SOURCEBOOK FOR THE IBM PERSONAL COMPUTER

C. LEWART

\$16.95

Designed for the electronic and communication engineer, programmer, student, and advanced electronic hobbyist, this collection of 20 programs covers the areas of electronic engineering, number theory, computer program design, data communication, probability, statistics, operations research, and applied math.

PH154: SYSTEMS MADE SIMPLE ON THE IBM PC

R. FLANDERS & D. FLANDERS

\$26.00

Now the techniques used to design major computer systems have been reduced to terms that average personal computer users can apply. Through Structured Analysis and Structured Programming approaches, the user is taken step-by-step through the design and implementation of the systems.

PH155: HOW TO WRITE AN IBM-PC PROGRAM

E. FAULK & DATAMOST

\$19.95

Assuming only a minimal knowledge of the computer, coverage includes everything from where to get programming ideas to fixing the bus the easy way. Illustrated.

PH156: BUSINESS APPLICATIONS FOR THE IBM PC

S. ZIMMERMAN & L. CONRAD

\$23.95

Designed for the first-time business user of the IBM PC. Offers step-by-step instructions on the use and customization of existing business software programs. Provides actual programs that are essential to many business functions.

PH157: INTRODUCTION TO CICS PROGRAMMING

L. MILLER & L. VIANDS

\$33.00

Presents a step-by-step, easy-to-follow introduction to the practical use of CICS — an IBM software product for data communications and the development of on-line computer applications. All examples shown are independent of the operating system, but they assume a basic knowledge of COBOL.

PH158: IBM FILES

D. MILLER

\$19.95

Shows how to access your IBM-PC's full potential. Takes the mystery and misery out of creating your own files. Written for both the beginning and advanced programmer.

PH159: BASIC FOR BUSINESS FOR IBM-PC

PARKER

\$26.00

PH160: USING THE IBM PERSONAL COMPUTER

T. LEWIS

\$19.95

A guide to general use of the IBM Personal Computer, covering BASIC commands, how to use word processing software, the use of VISICALC and creating new programs.

PH161: IBM BASIC FOR BUSINESS & HOME

R. FUNKHOUSER

\$19.95

Without the ponderous detail of the manufacturer's manual, this book shows the new micro user how to write programs for the IBM PC. No prior knowledge of computers or electronics is necessary to understand and use the information.

PH162: THE VISICALC BOOK FOR THE IBM PERSONAL COMPUTER

D. BEIL

\$20.95

This book is designed to help the user to get more out of VISICALC (an extremely useful "electronic spreadsheet" software program) on the IBM Personal Computer.

PH1540: 100 READY TO RUN PROGRAMS AND SUB-ROUTINES FOR THE IBM PC

\$27.95

Includes programs for Business (Text Editor, Mailing List, Alphabetizing and Sorting, Checking Account); Mathematics (Functions Analysis, Complex Number Math, Simultaneous Equations, etc.); Education (Spelling Bee, Trig lesson); Electronics (Colour Monitor Alignment, Ohms Law Equations, Circuit and Component Graphics); Graphics (Hi-Res Designs, Animated Graphics, Painting); Games (Several) and lots more. You'll learn how to use advanced programming features and how to start tailoring programs to your own special needs.

HB111: PROGRAMMING THE IBM PERSONAL COMPUTER:

BASIC

\$23.95

GRAHAM An introduction to programming in BASIC language. Users can apply material directly to their machine, with no adaptation necessary. An ideal introductory text to be used informally, or in classroom or training situations. Covers the unique features of the IBM Personal Computer, elements of BASIC and programming, and various applications (text editor programs, program for storing and retrieving information from random files, etc.).

HB112: PROGRAMMING THE IBM PERSONAL COMPUTER:

UCSD PASCAL

\$23.95

POLLACK "The Portable IBM PC Pascal!" Emphasizes the syntax of UCSD Pascal and good program design. An ideal introductory text to be used informally, or in classroom or training situations. Includes full coverage of the system and its uses, basic and advanced UCSD p-System™ functions. Easy to understand, user-oriented, reinforces working knowledge and application.

HB113: YOUR IBM PERSONAL COMPUTER:

BASIC AND APPLICATIONS

\$23.95

CORTESI Intended to get the first-time user over the hurdle of the initial introduction to the new machine. Provides a non-threatening, "confidence-building" introduction to the Personal Computer and to computing, BASIC language and software. (VisiCalc®, word processing, etc.). An ideal introductory text to be used informally, or in classroom or training situations. Focuses on central programming concepts, emphasizing IBM's version of MICROSOFT BASIC.

AH14: HOW TO USE THE IBM PERSONAL COMPUTER:

NOLAN

\$3.95

A simple introduction to one of the fastest selling personal computers. Filled with clear instructions and tips on set-up, expansion, specific applications, and maintenance.

SB22000: USING YOUR IBM® PERSONAL COMPUTER

\$23.95

Here's the most practical, most thorough guide on the market for computing with the IBM PC! Part One helps you get started with off-the-shelf programs, and shows you how to use the PC's system unit, keyboard, display screen, disk drives, and printer. Part Two teaches you to program in PC BASIC, with scores of examples to help you learn quickly. Fully explains all commonly used PC BASIC commands, including those for graphics, music, sound effects, and more.

PHS3: IBM PERSONAL COMPUTER: AN INTRODUCTION TO PROGRAMMING AND APPLICATIONS

L. GOLDSTEIN & M. GOLDSTEIN

\$46.00

Specifically designed for the computer novice. Offers immediate applications to business graphics, games and word processing. Book/Disk Package.

PHS4: EXECUTIVE'S GUIDE TO THE IBM PERSONAL COMPUTER: BASIC PROGRAMMING AND VISICALC

A. PARKER

\$59.95

Designed to give the business executive an introduction to BASIC programming. Demonstrates business programs for accounts receivable, general ledger, VisiCalc, and more. Book/Disk Package.

PHS5: CROSS REFERENCE UTILITY (CRF): A PROGRAMMING AID FOR THE IBM PC

J. HART, D. MAHAN, G. REYNOLDS, & THE SUMAR CORPORATION

\$44.95

Specifically designed to help the IBM PC programmer improve the quality of programs, this utility software provides a complete reference listing of variables in a BASIC program in order to review, analyze, and modify software. Software Package.



'PHS Codings include software disk or cassette'

ATARI COMPUTERS

ARCP8: 101 ATARI COMPUTER PROGRAMMING TIPS & TRICKS

A. NORTH

\$12.50

Learn-by-doing instruction, hints, secrets, shortcuts, techniques, for models 400/800/1200XL, includes 101 ready-to-run programs. 128 pages.

ARCP9: 31 NEW ATARI COMPUTER PROGRAMS FOR HOME, SCHOOL & OFFICE

A. NORTH

\$12.50

Practical type-and-run software for models 400/800/1200XL. 96 pages.

AHG9: UNDERSTANDING ATARI GRAPHICS BOOM

\$3.95

The popular Atari computers are ideal for writing graphic programs, such as games, charts, or object representations. This Handy Guide works the reader through the logic and mechanics of developing good graphics. For the beginning to advanced programmer.

AHG15: HOW TO USE THE ATARI COMPUTERS BOOM

\$3.95

A simple introduction to these fast-selling personal computers. Filled with clear instructions and tips on set-up, expansion, specific application, and maintenance.

PHS16: PAINT (48K ATARI WITH JOYSTICK)

\$52.00

CAPITAL CHILDREN'S MUSEUM Users actually create their own computer "paintings". The PAINT diskette provides access to hundreds of colour textures, allowing a virtually limitless number of artistic patterns. Book/Disk Package.

OSBORNE

PH163: USING THE OSBORNE 1 COMPUTER

T. LEWIS

\$19.95

The Osborne 1 is fast becoming one of the hottest selling personal/business computers on the market. This informative book shows the reader how to use it with word processing, databasing, VISICALC and programming.

PH164: OSBORNE USER'S GUIDE

L. GOLDSTEIN

\$19.95

The "applications handbook" that boosts the personal computer to full potential. This book uses the Osborne to guide readers to an understanding of BASIC. Using a relaxed, informal style, it explains programming, applications, peripheral devices, and software.

Computing Systems

TRS-80

PH119: HOW TO WRITE A TRS-80 PROGRAM **E. FAULK & DATAMOST (1983)** **\$19.95**
The authors develop an actual program with the reader to provide a simple set of examples for the topics discussed, and to add to the user's library of subroutines.

PH120: TRS-80 COBOL **R. GRAUER (1983)** **\$22.95**
Written specifically for the Radio Shack Model II and III computers, here is a learn-by-doing introduction to ANSI-74 COBOL as implemented on the TRS-80. Includes many programs and exercises.

PH121: HARDWARE INTERFACING WITH THE TRS-80 **J. UFFENBECK (1983)** **\$18.95**
TRS-80 Model I and Model III owners now have a book to help them understand how to use their personal computers to monitor and control electronics interfaces between the computer and the home or industrial environment. Contains 14 hands-on experiments using BASIC.

PH122: TRS-80 EXTENDED COLOR BASIC **R. HASKELL (1983)** **\$16.95**
Suitable for both classroom use and home self-instruction, this comprehensive, hands-on approach to BASIC programming on the TRS-80 colour computer comes complete with illustrated examples for the computer's video screen.

PH122B: EXPLORE COMPUTING WITH THE TRS-80 (AND COMMON SENSE): WITH PROGRAMMING IN BASIC **R. & J ANDREE (1982)** **\$15.95**
The guide teaches the keyboard, programming, and how to solve problems using the computer. Different starting points are provided so that complete beginners — as well as more advanced enthusiasts — can find material suited to their level of study.

PH123: TRS-80 DISK BASIC FOR BUSINESS MODEL II AND MODEL III **A. PARKER (1982)** **\$19.95**
An introductory guide for the popular TRS-80 computer and the BASIC language that's sure to answer all the questions with chapters on how to use a computer, why use BASIC, writing and running a program, entering data from a keyboard, report writing by computer, using canned programming, and more!

PH124: THE TRS-80 PROGRAMS AND APPLICATIONS FOR THE COLOR COMPUTER **A. BAKER (1982)** **\$19.95**
Al Baker shows how to use the TRS-80 colour computer to best advantage for storing important data, balancing the cheque book, playing games, and much more — while sharpening programming skills.

PH125: INTRODUCTION TO TRS-80 BASIC AND COMPUTER PROGRAMMING **M. ZABINSKI** **\$14.95**
Designed for use with the Radio-Shack TRS-80 computer this book discusses all the important concepts and applications of computer programming. Illustrated with many flowcharts, the book contains over 200 exercises.

PH126: TRS-80 MODEL III: PROGRAMMING AND APPLICATIONS **L. GOLDSTEIN** **\$19.95**
A top-notch introduction to computer programming using the TRS-80 Model III. Quickly brings the neophyte to near-professional levels.

PH127: TRS-80 ASSEMBLY LANGUAGE **H. HOWE, Jr.** **\$12.95**
Now for the first time user as well as the experienced user of the TRS-80 microcomputer, here is a book that explains assembly language programming in a thorough, yet easy to understand style.

PH128: TRS-80 ASSEMBLY LANGUAGE SUBROUTINES **W. BARDERN, Jr.** **\$24.95**
Easy-to-use "pre canned" routines that can be run as is, modified, or simply studied. Requires minimum effort from the user, all programs ready-to-run, covers the widest possible range of applications.

PH129: INTERFACE PROJECTS FOR THE TRS-80 **R. HALLIGREN** **\$16.95**
Provides TRS-80 users with a series of interface projects that are easily built and enable the user to discover the computer's capabilities through project construction. Projects are primarily hardware oriented but have programs supplied to support the hardware.

SB22009: TRS-80® MODEL I, III, AND COLOUR COMPUTER INTERFACING PROJECTS **\$20.95**
A unique book for beginning interfacing which includes 14 simple, useful, and easy-to-build construction projects to help you make use of your TRS-80 computer in the real world. Presents an easily understood, complete tutorial with full documented, debugged software written specifically for the TRS-80 models I and III, and the Colour Computer.

SB21865: MOSTLY BASIC: APPLICATIONS FOR YOUR TRS-80®, BOOK 2 **H. BERENBON** **\$18.50**
Another goldmine of ready-to-run BASIC programs — 32 in all! Includes two dungeons that test your ability in history and math, a Dungeon of Danger that's strictly for fun, eleven household programs, seven on money and investment (three of which are on the stock market), two that test your ESP level, and more! Complete with an explanation, sample run, and listing for each program.

SB22046: TRS-80® FOR KIDS FROM 8 TO 80, VOL. 1 **M. ZABINSKI** **\$13.95**
An enjoyable, easy to follow, and amazingly effective book suitable for beginning TRS-80 programmers of any age, especially youngsters. No special background is needed. Same principles used at National Computer Camp help you quickly begin writing computer programs and encourage you to try many examples. Excellent as a classroom text or for self-study.

PHS6: TRS-80 MOD III ASSEMBLY LANGUAGE TUTOR **H. HOWE, Jr.** **\$38.95**
A book/software tutorial that makes it easy to learn assembly language programming and interfacing with the TRS-80 Model III. Requires only a basic knowledge of level II BASIC. Book/Disk Package.

ARCP5: 101 COLOUR COMPUTER PROGRAMMING TIPS & TRICKS **R. CLARK** **\$11.15**
Learn-by-doing instructions, hints, secrets, shortcuts, techniques, insights, includes 101 ready-to-run programs. 128 pages.

ARCP6: 55 COLOUR COMPUTER PROGRAMS FOR HOME, SCHOOL & OFFICE **R. CLARK** **\$13.95**
Practical ready-to-run software with colourful graphics. 128 pages.

ARCP7: 55 MORE COLOUR COMPUTER PROGRAMS FOR HOME, SCHOOL & OFFICE **R. CLARK** **\$13.95**
Handy companion volume packed with different useful type-and-run software. 112 pages.

SB21893: TRS-80® COLOUR COMPUTER INTERFACING **\$20.95**
Teaches you the interfacing techniques, inner workings, and operation of the TRS-80 Colour Computer as well as its high-performance 6809 microprocessor. Find out how to control and monitor various equipment and events by means of the Computer's expansion connectors. Excellent info for budding electronic and computer engineers and technicians at all levels.

TIMEX/SINCLAIR

BP109: THE ART OF PROGRAMMING THE 1K ZX81 **M. JAMES & S.M. GEE** **\$7.60**

This book shows you how to use the features of the ZX81 in programs that fit into the 1K machine and are still fun to use. Chapter Two explains the random number generator and uses it to simulate coin tossing and dice throwing and to play pongo. Chapter Three shows the patterns you can display using the ZX81's graphics. Its animated graphics capabilities, explored in Chapter Four, have lots of potential for use in games of skill, such as Lunar Lander and Cannon-ball which are given as complete programs. Chapter Five explains PEEK and POKE and uses them to display large characters. The ZX81's timer is explained in Chapter Six and used for a digital clock, a chess clock and a reaction time game. Chapter Seven is about handling character strings and includes three more ready-to-run programs — Hangman, Coded Messages and a number guessing game. In Chapter Eight there are extra programming hints to help you get even more out of your 1K ZX81.

BP114: THE ART OF PROGRAMMING THE 16K ZX81 **M. JAMES & S.M. GEE** **\$9.90**

The book starts by introducing the 16K RAM pack and the printer. It continues by explaining how the extra storage is used and presents a memory test program to check that the 16K RAM pack is operational. Chapter Three covers some utilities that you will find useful in writing longer programs. Chapter Four is an interlude from serious applications, presenting four games programs that make the most of the extended graphics capabilities now available to you. Chapters Five to Eight deal with writing and debugging large programs, storing them on cassettes and printing out both programs themselves and their results. These chapters also introduce programs for editing data bases and statistical analysis for financial management and covers text and graphics printing. Chapter Nine takes a look at randomness. Chapter Ten introduces machine code and explains why you might like to use it.

SELF-TEACHING SOFTWARE FOR THE ZX81 AND TIMEX SINCLAIR 1000: MATHEMATICS I-VI **J. GLADSTONE**

Software Package:

- I. PHS8, \$44.95
- II. PHS9, \$44.95
- III. PHS10, \$44.95
- IV. PHS11, \$44.95
- V. PHS12, \$44.95
- VI. PHS13, \$44.95

Designed to give children ages 5-12 the learning advantage! Each program contains 4 cassette tapes with 32 lessons, games, and activities, and a 32 page activities book, all packaged in a handsome vinyl binder. Written by a leading Canadian educator.

SB21957: TIMEX SINCLAIR 1000/ZX81 BASIC BOOK **R. NORMAN** **\$18.95**

A practical, usable book that neatly and effectively teaches ZX81 BASIC language and programming techniques to owners of the ZX81 personal computer. Includes many programming tips to help make your ZX81 programs more efficient. Ideal for the novice computerist as well as any new owner of the ZX81.

ARCP1: 101 TIMEX 1000/SINCLAIR ZX-81 PROGRAMMING TIPS & TRICKS **E. PAGE** **\$11.15**
Secrets, hints, shortcuts, learn-by-doing instructions, techniques, includes 101 ready-to-run programs. 128 pages.

ARCP2: 37 TIMEX 1000/SINCLAIR ZX-81 COMPUTER PROGRAMS FOR HOME, SCHOOL AND OFFICE **E. PAGE** **\$12.50**
Practical type-and-run software. 96 pages.

PH139: FIFTY 1K/2K GAMES FOR THE TIMEX/SINCLAIR 1000 AND THE ZX-81 **A. GOURLAY, J. WALSH & P. HOLMES** **\$14.95**
The most complete selection of games ever assembled for the Sinclair ZX-81 and Timex 1000 personal computers. Dogfight, Breakout, Outlaw, Galaxian, Roadracer, Alien Invasion, and dozens more!

PH140: THE EXPLORER'S GUIDE TO THE ZX81 AND THE TIMEX SINCLAIR 1000 **M. LORD** **\$16.95**
Coverage includes features of BASIC not found in beginner's guides, as well as machine code programming, 30 games and other programs, application routines, programming utilities, and more.

PH141: 30 PROGRAMS FOR THE TIMEX-PC 1000 **MELBOURNE HOUSE PUBLISHERS** **\$12.95**
Presents a collection of 30 interesting and varied programs for the Timex-PC 1000/ZX81. Complete with fully explained programs, scores of programming hints and space-saving techniques.

PH142: PROGRAMMING YOUR TIMEX/SINCLAIR 1000 IN BASIC **M. EISENBACHER** **\$12.95**
A simple, straightforward introduction to BASIC programming on the TIMEX/Sinclair 1000 written specifically for those with no previous computer experience.

PH143: BASICS OF TIMEX SINCLAIR BASIC **WALACH** **\$14.95**

PH144: MAKING THE MOST OF YOUR ZX-81 **T. HARTNELL** **\$14.95**
This handbook focuses on all the additional features of the ZX-81. There are new games and useful learning tricks, plus instructions on how to write programs that really work. It guides the reader from start to finish using each feature of the computer.

PH145: THE ZX-81 POCKET BOOK **T. TOMS** **\$14.95**
This handy manual teaches how to create new programs and helps the creator understand why they work. Here's what the ZX-81 can do . . . which extras will enable it to do even more . . . how to use ZX-81 BASIC in the best ways . . . and, for ZX81 owners, how to convert their system into the advanced ZX-81.

PH146: 49 EXPLOSIVE GAMES FOR THE ZX-81 **T. HARTNELL** **\$14.95**
Galactic Intruders, Breakout, Checkers, Death Maze, Star Trek, Smugglers Mold, and forty-three other favourites are all here and especially adapted for the ZX-81. This fascinating gamebook gives programming instructions for all 49 marvelous games PLUS complete and easy-to-understand rules.

PH147: PET BASIC I **R. ZAMORA, et al** **\$19.95**
Filled with many examples, do-it-yourself exercises, and thought provoking explorations, this concise yet complete guide encourages readers to experiment with the machine's numerous features and capabilities.

PH148: PET GAMES AND RECREATION **M. OGELSBY, et al** **\$16.95**
Easy-to-understand directions included for each game provide: a game description and the objective — a summary of instructions for both player and computer — the level of difficulty — strategy hints — and more!

PH149: MASTERING MACHINE CODE ON YOUR ZX-81 **T. BAKER** **\$16.95**
This comprehensive, easy-to-understand handbook is virtually the first material available on ZX machine code. It includes the ins and outs of machine code translation, the secrets of the ZX-81, how to adapt the code to the ZX-80, and language translation between BASIC and ZX machine code.

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Computing Systems

PET/CBM/VIC

PH130: PET/CBM: AN INTRODUCTION TO BASIC PROGRAMMING AND APPLICATIONS

G. STREITMATTER & L. GOLDSTEIN (1983) \$19.95
Includes an introduction to BASIC as well as a survey of applications, peripheral devices, and software. Immediate applications for business, graphics, games, and word processing make this book a useful tool for any PET owner.

PH131: ZAP! POW! BOOM!

ARCADE GAMES FOR THE VIC 20
T. HARTNELL & M. RAMSHAW (1983) \$16.95

Move through the maze eating dots with MAZEMAN. Sail through space zapping the ASTROIDS. Outshoot the fastest draw in town GUNFIGHT. Owners of the VIC 20 can now play these games — and more — simply by following the programs outlined in this handy guide.

PH132: VIC BASIC: A USER-FRIENDLY GUIDE
R. ZAMORA, D. INMAN, R. ALBRECHT, & DYMIX \$16.95

This is a practical guide to the Commodore VIC, one of the first low-cost computers that allows the user to combine colour, sound, and graphics easily. Here, the reader will learn to write programs taking full advantage of all these capabilities.

PH133: 25 ADVANCED GAMES FOR PET/CBM
HATCH (1983) \$19.95

PH134: THE PET PERSONAL COMPUTER FOR BEGINNERS
S. DUNN & V. MORGAN (1982) \$20.20

Authors Dunn and Morgan have developed a learn-by-doing approach for using the popular, personal PET computer. The book is written not for the mathematician or computer specialist, but for the hobbyist, child, student and small business.

PH135: PET/CBM: AN INTRODUCTION TO BASIC PROGRAMMING AND APPLICATIONS

L. GOLDSTEIN (1982) \$19.95

This well-written introduction to programming in BASIC for the popular PET computer is a must for the novice programmer. It includes an introduction to BASIC as well as a survey of applications, peripheral devices and software. Immediate applications for business, graphics, games, and word processing make this book a useful tool for any PET owner.

PH136: PET/CBM BASIC
R. HASKELL (1982) \$16.95

Ideal for the beginning or advanced programmer, this book offers a step-by-step approach to top-down programming that can help students and business people apply fundamental concepts and program a computer with ease and expertise.

PH137: STARTING WITH BASIC
ON THE COMMODORE VIC-20

D. MONROE/B. TIDY (1982) \$14.95

Here's a real computer book for real people! It's designed for true beginners who own — or are considering purchasing — the Commodore VIC-20. It helps these novices learn to program the VIC in BASIC computer language, and goes on to teach them the unlimited capabilities of their machine.

PH138: THE COMAL HANDBOOK
L. LINDSAY (1982) \$24.95

The COMAL Handbook is a reference to assist the COMAL (a language developed for use with Commodore computers that combines the best features of BASIC and PASCAL) user in learning by doing rather than strictly by reading.

PH57: START WITH BASIC FOR THE COMMODORE VIC 20

D. MONROE \$32.95

This book/cassette package shows the reader how easy it is to create programs using the full capacity of the machine. Includes helpful exercises and step-by-step instructions to put the full power of the VIC 20 at the user's fingertips. Book/Cassette Package.

HB132: COMPUTE!'S FIRST BOOK OF VIC \$19.95

In the style of our First Books of Atari and PET/CBM, this book contains many of the articles and applications featured in past issues of COMPUTE! Magazine. Approximately 20-30% of the book is material that has not been previously published. An excellent resource book for Commodore VIC-20 owners.

SB2056: COMMODORE 64 PROGRAMMER'S

REFERENCE GUIDE \$27.95

A creative programmer's working tool and reference source, packed with professional tips and special information for getting the most out of your Commodore 64! Includes a complete, detailed dictionary of all Commodore BASIC commands, statements, and functions, followed by BASIC program samples showing how each item works. Also tells you how to mix machine language with BASIC, use hi-res effectively, and much more! By Commodore Computer, 486 pages.

SB21948: VIC 20 PROGRAMMER'S
REFERENCE GUIDE \$23.45

Provides a complete VIC 20 BASIC vocabulary guide, a section on machine-language programming, a programming tips guide with suggestions on how to improve your programming skills, and a special section on VIC 20 input/output operations. An easy-to-use, detailed manual that helps you program your VIC 20 like a pro! By Commodore Computer. 289 pages.

SB22001: MOSTLY BASIC: APPLICATIONS FOR YOUR
PET®, BOOK 2
H. BERENBON

\$19.95
A second collection of ready-to-run BASIC programs that includes a history dungeon, a math dungeon, a Dungeon of Danger that's strictly for fun, eleven household programs, seven on money and investment (three of which are on the stock market), two that test your ESP level, and more! Thirty-seven programs in all, each complete with an explanation, sample run, and listing.

PET GAMES AND RECREATION

AB002 \$16.95

A variety of interesting games designed to amuse and educate. Games include such names as Capture, Tic Tac Toe, Watchperson, Motie, Sinners, Martian Hunt and more.

PET BASIC — TRAINING YOUR PET COMPUTER

AB014 \$19.95

Officially approved by Commodore, this is the ideal reference book for long time PET owners or novices. In an easy to read and humorous style, this book describes techniques and experiments, all designed to provide a strong understanding of this versatile machine.

SB22010: COMMODORE 64 USER'S GUIDE

2nd EDITION \$18.50

The same book that comes packed with every Commodore 64 computer! Shows you how to set up, program, and operate your Commodore 64, including how to do arcade-type colour animation, music, and sound effects, how to interface with a host of peripherals, and how to use packaged programs from Commodore and other manufacturers. Helps you get into computing in a big way, even if you've never used a computer before. By Commodore Computer.

SB21944: COMMODORE SOFTWARE ENCYCLOPEDIA

2nd EDITION \$13.95

Most comprehensive directory you'll find of software for the Commodore PET. Lists materials in 10 categories, including personal aids, technical aids, and firmware. Ranges from business to education, to games, and shows Canadian and European PET software too. By Commodore Computer.

PET™ GRAPHICS

HAMPSHIRE \$26.95

HB127: All subroutines available on PET disk, \$35.00

HB128: Written to instruct the PET user on how to program grid displays. Provides a collection of machine language subroutines, enabling the PET owner to write more efficient programs. Provides a wide range normally unavailable graphic functions. Includes fine resolution plotting, double density plotting, multiple screen page displays, interfacing a light pen with the PET, and appendices on circuit diagrams of PET Video Circuitry and ASCII codes used by the PET.

LIBRARY OF PET™ SUBROUTINES

HAMPSHIRE \$23.95

HB129: All subroutines available on PET disk, \$35.00

HB130: PET software designers will save considerable time writing applications programs with this book. Provides more than 53 proven subroutines as well as a logical framework to build new programs. Each subroutine is supported with complete information describing its purpose and the problems that may arise in its implementation.

ADDITIONAL BOOKS

BP113: 30 Solderless Breadboard Projects-Book 2
R.A. Penfold \$8.85

A companion to BP107. Describes a variety of projects that can be built on plug-in breadboards using CMOS logic IC's. Each project contains a schematic, parts list and operational notes.

BP128: 20 Programs for the ZX Spectrum and 16K ZX81
S. Daly \$7.60

Although designed for two specific machines, notes are included on conversion. Flow charts are often included together with a description of program operation. The programs themselves run from card and other games, through sorting and filing applications to uses in statistics and engineering.

BP112: A Z-80 Workshop Manual
E.A. Parr \$10.95

This book is intended for people who want to progress beyond the stage of BASIC to topics such as machine code and assembly language programming. Also given are hardware details and the use of associated I/O devices such as UARTS, PIOs and CTCs. Additional reference data are also given.

BP124: Easy Add-on Projects for Spectrum, ZX81 & Ace
Owen Bishop \$10.95

Projects include a Pulse Detector, Picture Digitiser, Five-key Pad, Model Controller, Beeper, Light Flasher, Magnetic Catch, Lap Sensor, Photo-flash, Games Control and six more projects that make up a weather station.

BP121: How to Design and Make Your Own PCBs
R.A. Penfold \$7.60

The emphasis is on practical rather than theoretical techniques. Starts by giving simple methods of copying from magazines, carries on with photographic methods of producing PCBs and continues with layout design.

BP129: An Introduction to Programming the ORIC-1
R.A.S. Penfold \$7.60

Designed to complement the manual of the ORIC computer. Deals with animated graphics with a heavy emphasis on games. Covers Variables and Codes, In and Outs, Animation and Loops, Attributes, Characters and Time, The Sound Generator, Decisions, Structured Programming, Data Filing Ideas and Interfacing.

BP125: 25 Simple Amateur Band Aerials

E.M. Noll \$7.60

Starting from simple dipoles through beam, triangle and even mini-rhombics (made from TV masts and 400ft of wire) this title describes several simple and inexpensive aerials to construct yourself. A complete set of dimension table are included.

BP104: Electronic Science Projects

Owen Bishop \$8.85

Contains 12 electronic projects with a strong scientific flavour. Includes Simple Colour Temperature Meter, Infrared Laser, Electronic clock regulated by a resonating spring, a Scope with a solid state display, pH meter and electrocardiograph.

BP118: PRACTICAL ELECTRONIC BUILDING BLOCKS -

Book 2
R.A. Penfold \$7.60

This sequel to BP117 is written to help the reader create and experiment with his own circuits by combining standard type circuit building blocks. Circuits concerned with generating signals were covered in Book 1, this one deals with processing signals. Amplifiers and filters account for most of the book but comparators, Schmitt triggers and other circuits are covered.

BP119: THE ART OF PROGRAMMING THE ZX SPECTRUM

M. JAMES \$9.95

The ZX Spectrum gives the user almost unlimited scope with colour, offers high and low resolution graphics as well as sound — with these you can do some excellent programs. Text covers: Getting to Know the Spectrum, Low Res Graphics, Fun at Random, Hi Res Graphics, Sound, Moving Graphics, PEEK and POKE, A Sense of Time, Strings and Words and Advanced Graphics.

BP126: BASIC AND PASCAL IN PARALLEL

S.J. WAINWRIGHT \$5.75

This book takes the two languages and develops programs in both simultaneously. Emphasis is placed on structured programming by the systematic use of control structures and modular program design is used throughout. Examples of programs are used to illustrate the structures as they are introduced and the reader learns by example.



See back page of catalogue for ordering details. No taxes apply to books.

Electronics

ELECTRONICS BEGINNERS

PH255: COMPLETE GUIDE TO READING SCHEMATIC DIAGRAMS, 2nd Edition

J. DOUGLAS-YOUNG \$9.95

Packed with scores of easy-to-understand diagrams and invaluable troubleshooting tips as well as a circuit finder chart and a new section on logic circuits.

PH251: BEGINNER'S HANDBOOK OF IC PROJECTS

D. HEISERMAN \$16.95

Welcome to the world of integrated circuit (IC) electronic projects. This book contains over 100 projects (each including a schematic diagram, parts list, and descriptive notes.)

PH252: DIGITAL ICs: HOW THEY WORK AND HOW TO USE THEM

A. BARBER \$10.95

The dozens of illustrations included in this essential reference book will help explain time-saving test procedures, interpreting values, performing voltage measurements, and much more!

PH249: THE BEGINNER'S HANDBOOK OF ELECTRONICS

G. OLSEN & M. MIMS, III \$10.95

In this basic book, the authors cover the entire spectrum of modern electronics, including the use of such components as integrated circuits and semiconductor devices in record players, radio receivers, airplane guidance systems, and many others.

THE BEGINNER'S HANDBOOK OF ELECTRONICS

AB003 \$10.95

An excellent textbook for those interested in the fundamentals of Electronics. This book covers all major aspects of power supplies, amplifiers, oscillators, radio, television and more.

ELECTRONIC THEORY

ELEMENTS OF ELECTRONICS — AN ON-GOING SERIES

F.A. WILSON, C.G.I.A., C.Eng.,

BP62: BOOK 1. The Simple Electronic Circuit and Components \$8.45

BP63: BOOK 2. Alternating Current Theory \$8.45

BP64: BOOK 3. Semiconductor Technology \$8.45

BP77: BOOK 4. Microprocessing Systems And Circuits \$11.70

BP89: BOOK 5. Communication \$11.70

The aim of this series of books can be stated quite simply — it is to provide an inexpensive introduction to modern electronics so that the reader will start on the right road by thoroughly understanding the fundamental principles involved.

Although written especially for readers with no more than ordinary arithmetical skills, the use of mathematics is not avoided, and all the mathematics required is taught as the reader progresses.

Each book is a complete treatise of a particular branch of the subject and, therefore, can be used on its own with one proviso, that the later books do not duplicate material from their predecessors, thus a working knowledge of the subjects covered by the earlier books is assumed.

BOOK 1: This book contains all the fundamental theory necessary to lead to a full understanding of the simple electronic circuit and its main components.

BOOK 2: This book continues with alternating current theory without which there can be no comprehension of speech, music, radio, television or even the electricity utilities.

BOOK 3: Follows on semiconductor technology, leading up to transistors and integrated circuits.

BOOK 4: A complete description of the internal workings of microprocessor.

BOOK 5: A book covering the whole communication scene.

PH241: DC ELECTRONICS

\$16.95

Covers everything from voltage current, and resistance relationships to more advanced studies of electrical measurements, circuits, resistors, capacitors, and inductors.

PH242: AC ELECTRONICS

\$16.95

Covers AC fundamentals and theory. Includes discussions and experiments in resonance and reactance, RC, RL, and RLC circuits, and how to work with formulas to analyze the operations of AC circuitry.

PH243: ELECTRONICS CIRCUITS

\$16.95

Covers all of the most popular electronic circuits, with emphasis on integrated circuits.

PH244: SEMICONDUCTOR DEVICES

\$16.95

Covers semi-conductor fundamentals, diodes, zeners, bipolar transistor operation and characteristics, FETs, thyristors, ICs, and optoelectronics.

PH247: DIGITAL TECHNIQUES

\$19.95

Covers logic circuits, Boolean Algebra, flip-flops, registers, combinational logic circuitry, and digital design.

Tab1531: CONCEPTS OF DIGITAL ELECTRONICS

\$21.95

This book erases the mysteries surrounding digital electronics theory. Understand and use low-cost 7400 series IC's to produce working digital devices including a power supply and a breadboard experimenter.

PROJECTS

BP48: ELECTRONIC PROJECTS FOR BEGINNERS

\$5.40

F.G. RAYER, T.Eng.(CEI), Assoc.IERE
Another book written by the very experienced author — Mr. F.G. Rayer — and in it the newcomer to electronics, will find a wide range of easily made projects. Also, there are a considerable number of actual component and wiring layouts, to aid the beginner.

Furthermore, a number of projects have been arranged so that they can be constructed without any need for soldering and, thus, avoid the need for a soldering iron.

Also, many of the later projects can be built along the lines as those in the 'No Soldering' section so this may considerably increase the scope of projects which the newcomer can build and use.

221: 28 TESTED TRANSISTOR PROJECTS

R.TORRENS \$5.00

Mr. Richard Torrens is a well experienced electronics development engineer and has designed, developed, built and tested the many useful and interesting circuits included in this book. The projects themselves can be split down into simpler building blocks, which are shown separated by boxes in the circuits for ease of description, and also to enable any reader who wishes to combine boxes from different projects to realise ideas of his own.

BP49: POPULAR ELECTRONIC PROJECTS

R.A. PENFOLD \$5.75

Includes a collection of the most popular types of circuits and projects which, we feel, will provide a number of designs to interest most electronics constructors. The projects selected cover a very wide range and are divided into four basic types: Radio Projects, Audio Projects, Household Projects and Test Equipment.

EXPERIMENTER'S GUIDE TO SOLID STATE ELECTRONIC PROJECTS

AB007 \$9.95

An ideal sourcebook of Solid State circuits and techniques with many practical circuits. Also included are many useful types of experimenter gear.

BP71: ELECTRONIC HOUSEHOLD PROJECTS

R.A. PENFOLD \$7.20

Some of the most useful and popular electronic construction projects are those that can be used in or around the home. The circuits range from such things as '2 Tone Door Buzzer', Intercom, through Smoke or Gas Detectors to Baby and Freezer Alarms.

BP94: ELECTRONIC PROJECTS FOR CARS AND BOATS

\$8.10

R.A. PENFOLD \$7.60

Projects, fifteen in all, which use a 12V supply are the basis of this book. Included are projects on Windscreen Wiper Control, Courtesy Light Delay, Battery Monitor, Cassette Power Supply, Lights Timer, Vehicle Immobiliser, Gas and Smoke Alarm, Depth Warning and Shaver Inverter.

BP69: ELECTRONIC GAMES

R.A. PENFOLD \$7.05

In this book Mr. R. A. Penfold has designed and developed a number of interesting electronic game projects using modern integrated circuits. The text is divided into two sections, the first dealing with simple games and the latter dealing with more complex circuits.

BP95: MODEL RAILWAY PROJECTS

\$7.60

Electronic projects for model railways are fairly recent and have made possible an amazing degree of realism. The projects covered include controllers, signals and sound effects: stroboscopic layouts are provided for each project.

BP93: ELECTRONIC TIMER PROJECTS

F.G. RAYER \$7.60

Windscreen wiper delay, darkroom timer and metronome projects are included. Some of the more complex circuits are made up from simpler sub-circuits which are dealt with individually.

110 OP-AMP PROJECTS

MARSTON \$12.95

This handbook outlines the characteristics of the op-amp and present 110 highly useful projects — ranging from simple amplifiers to sophisticated instrumentation circuits.

110 IC TIMER PROJECTS

GILDER \$10.95

HB25 \$10.95

This sourcebook maps out applications for the 555 timer IC. It covers the operation of the IC itself to aid you in learning how to design your own circuits with the IC. There are application chapters for timer-based instruments, automotive applications, alarm and control circuits, and power supply and converter applications.

BP110: HOW TO GET YOUR ELECTRONIC PROJECTS WORKING

R.A. PENFOLD \$7.60

We have all built circuits from magazines and books only to find that they did not work correctly, or at all, when first switched on. The aim of this book is to help the reader overcome just these problems by indicating how and where to start looking for many of the common faults that can occur when building up projects.

PH250: EXPERIMENTER'S GUIDE TO SOLID STATE ELECTRONICS PROJECTS

\$9.95

A. BARBER \$9.95

This book takes the mystery out of solid state electronics and enables the reader to build such useful devices as: series regulated power supplies, light dimmers, solar cell operated radios, hi-fi amplifiers, light indicators for battery operated equipment and much more.

110 THYRISTOR PROJECTS USING SCR'S AND TRIACS

MARSTON \$12.95

HB22 \$12.95

A grab bag of challenging and useful semiconductor projects for the hobbyist, experimenter, and student. The projects range from simple burglar, fire, and water level alarms to sophisticated power control devices for electric tools and trains. Integrated circuits are incorporated wherever their use reduces project costs.

110 CMOS DIGITAL IC PROJECTS

MARSTON \$11.25

HB23 \$11.25

Outlines the operating characteristics of CMOS digital ICs and then presents and discusses 110 CMOS digital IC circuits ranging from inverter gate and logic circuits to electronic alarm circuits. Ideal for amateurs, students and professional engineers.

BP76: POWER SUPPLY PROJECTS

R.A. PENFOLD \$6.80

Line power supplies are an essential part of many electronics projects. The purpose of this book is to give a number of power supply designs, including simple unregulated types, fixed voltage regulated types, and variable voltage stabilised designs, the latter being primarily intended for use as bench supplies for the electronics workshop. The designs provided are all low voltage types for semiconductor circuits.

There are other types of power supply and a number of

these are dealt with in the final chapter, including a cassette power supply, Ni-Cad battery charger, voltage step up circuit and a simple inverter.

BP84: DIGITAL IC PROJECTS

F.G. RAYER, T.Eng.(CEI), Assoc.IERE \$7.60

This book contains both simple and more advanced projects and it is hoped that these will be found of help to the reader developing a knowledge of the workings of digital circuits. To help the newcomer to the hobby the author has included a number of board layouts and wiring diagrams. Also the more ambitious projects can be built and tested section by section and this should help avoid or correct faults that could otherwise be troublesome. An ideal book for both beginner and more advanced enthusiast alike.

BP67: COUNTER DRIVER AND NUMERAL DISPLAY PROJECTS

F.G. RAYER, T.Eng.(CEI), Assoc. IERE \$7.05

Numerical indicating devices have come very much to the forefront in recent years and will, undoubtedly, find increasing applications in all sorts of equipment. With present day integrated circuits, it is easy to count, divide and display numerically the electrical pulses obtained from a great range of driver circuits.

In this book many applications and projects using various types of numeral displays, popular counter and driver IC's etc. are considered.

BP73: REMOTE CONTROL PROJECTS

OWEN BISHOP \$8.10

This book is aimed primarily at the electronics enthusiast who wishes to experiment with remote control. Full explanations have been given so that the reader can fully understand how the circuits work and can more easily see how to modify them for other purposes, depending on personal requirements. Not only are radio control systems considered but also infra-red, visible light and ultrasonic systems as are the use of Logic ICs and Pulse position modulation etc.

BP99: MINI-MATRIX BOARD PROJECTS

R.A. PENFOLD \$7.60

Twenty useful projects which can all be built on a 24 x 10 hole matrix board with copper strips. Includes Doorbuzzer, Low-voltage Alarm, AM Radio, Signal Generator, Projector Timer, Guitar Headphone Amp, Transistor Checker and more.

BP103: MULTI-CIRCUIT BOARD PROJECTS

R.A. PENFOLD \$7.60

This book allows the reader to build 21 fairly simple electronic projects, all of which may be constructed on the same printed circuit board. Wherever possible, the same components have been used in each design so that with a relatively small number of components and hence low cost, it is possible to make any one of the projects or by re-using the components and P.C.B. all of the projects.

Tab1431: DIGITAL ELECTRONIC PROJECTS

\$20.95

Build a deluxe code oscillator, a digital game called Climb-the-Mountain, a clock with alarm, a metric measuring wheel, a modular decade counter, even a 14-note music generator. 17 projects in all.

BP107: 30 SOLDERLESS BREADBOARD PROJECTS

— BOOK 1 \$8.85

R.A. PENFOLD

A "Solderless Breadboard" is simply a special board on which electronic circuits can be built and tested. The components used are just plugged in and unplugged as desired.

The 30 projects featured in this book have been specially designed to be built on a "Verobloc" breadboard. Wherever possible the components used are common to several projects, hence with only a modest number of reasonably inexpensive components it is possible to build, in turn, every project shown.

BP106: MODERN OP-AMP PROJECTS
R.A. PENFOLD

Features a wide range of constructional projects which make use of op-amps including low-noise, low distortion, ultra-high input impedance, high slew-rate and high output current types.

\$7.60

CIRCUITS

BP80: POPULAR ELECTRONIC CIRCUITS — BOOK 1
R.A. PENFOLD

Another book by the very popular author, Mr. R.A. Penfold, who has designed and developed a large number of various circuits. These are grouped under the following general headings: Audio Circuits, Radio Circuits, Test Gear Circuits, Music Project Circuits, Household Project Circuits and Miscellaneous Circuits.

\$7.75
BP88: POPULAR ELECTRONIC CIRCUITS, BOOK 2
R.A. PENFOLD

70 plus circuits based on modern components aimed at those with some experience.

\$8.85
The GIANT HANDBOOK OF ELECTRONIC CIRCUITS
TAB No.1300
\$27.95

About as twice as thick as the Webster's dictionary, and having many more circuit diagrams, this book is ideal for any experimenter who wants to keep amused for several centuries. If there isn't a circuit for it in here, you should have no difficulty convincing yourself you don't really want to build it.

\$5.00
BP39: 50 (FET) FIELD EFFECT TRANSISTOR PROJECTS
F.G. RAYER, T.Eng.(CEI), Assoc.IERE

Field effect transistors (FETs), find application in a wide variety of circuits. The projects described here include radio frequency amplifiers and converters, test equipment and receiver aids, tuners, receivers, mixers and tone controls, as well as various miscellaneous devices which are useful in the home.

\$5.00

This book contains something of particular interest for every class of enthusiast — short wave listener, radio amateur, experimenter or audio devotee.

\$5.40
BP87: SIMPLE L.E.D. CIRCUITS
R.N. SOAR

Since it first appeared in 1977, Mr. R.N. Soar's book has proved very popular. The author has developed a further range of circuits and these are included in Book 2. Projects include a Transistor Tester, Various Voltage Regulators, Testers and so on.

\$3.05
BP42: 50 SIMPLE L.E.D. CIRCUITS
R.N. SOAR

The author of this book, Mr. R.N. Soar, has compiled 50 interesting and useful circuits and applications, covering many different branches of electronics, using one of the most inexpensive and freely available components — the Light Emitting Diode (L.E.D.). A useful book for the library of both beginner and more advanced enthusiast alike.

\$7.60
BP82: ELECTRONIC PROJECTS USING SOLAR CELLS
OWEN BISHOP
\$7.60

The book contains simple circuits, almost all of which operate at low voltage and low currents, making them suitable for being powered by a small array of silicon cells. The projects cover a wide range from a bicycle speedometer to a novelty 'Duck Shoot'; a number of power supply circuits are included.

\$5.00
BP37: 50 PROJECTS USING RELAYS,
SCR's & TRIACS
\$5.00
F.G. RAYER, T.Eng.(CEI), Assoc.IERE

Relays, silicon controlled rectifiers (SCR's) and bi-directional triodes (TRIACs) have a wide range of applications in electronics today. This book gives tried and practical working circuits which should present the minimum of difficulty for the enthusiast to construct. In most of the circuits there is a wide latitude in component values and types, allowing easy modification of circuits or ready adaptation of them to individual needs.

\$3.75
BP24: 50 PROJECTS USING IC741
RUDI & UWE REDMER
\$3.75

This book, originally published in Germany by TOPP, has achieved phenomenal sales on the Continent and Babani decided, in view of the fact that the integrated circuit used in this book is inexpensive to buy, to make this unique book available to the English speaking reader. Translated from the original German with copious notes, data and circuitry, a "must" for everyone whatever their interest in electronics.

\$7.70
BP83: VMOS PROJECTS
R.A. PENFOLD
\$7.70

Although modern bipolar power transistors give excellent results in a wide range of applications, they are not without their drawbacks or limitations. This book will primarily be concerned with VMOS power FETs although power MOSFETs will be dealt with in the chapter on audio circuits. A number of varied and interesting projects are covered under the main headings of: Audio Circuits, Sound Generator Circuits, DC Control Circuits and Signal Control Circuits.

BP44: IC 555 PROJECTS
E.A. PARR, B.Sc., C.Eng., M.I.E.E.
\$7.05

Every so often a device appears that is so useful that one wonders how life went on before without it. The 555 timer is such a device. Included in this book are Basic and General Circuits, Motor Car and Model Railway Circuits, Alarms and Noise Makers as well as a section on the 556, 558 and 559 timers.

BP65: SINGLE IC PROJECTS
R.A. PENFOLD
\$6.05

There is now a vast range of ICs available to the amateur market, the majority of which are not necessarily designed for use in a single application and can offer unlimited possibilities. All the projects contained in this book are simple to construct and are based on a single IC. A few projects employ one or two transistors in addition to an IC but in most cases the IC is the only active device used.

BP97: IC PROJECTS FOR BEGINNERS
F.G. RAYER
\$7.60

Covers power supplies, radio, audio, oscillators, timers and switches. Aimed at the less experienced reader, the components used are popular and inexpensive.

BP88: HOW TO USE OF AMPS
E.A. PARR
\$8.85

A designer's guide covering several op amps, serving as a source book of circuits and a reference book for design calculations. The approach has been made as non-mathematical as possible.

IC ARRAY COOKBOOK
JUNG
\$13.75

IC Array Cook Book is a practical handbook aimed at solving electronic circuit application problems by using IC arrays. An IC array, unlike specific-purpose ICs, is made up of uncommitted IC active devices, such as transistors, resistors, etc. This book covers the basic types of such ICs and illustrates with examples how to design with them. Circuit examples are included, as well as general design information useful in applying arrays.

BP50: IC LM3900 PROJECTS
H.KYBETT, B.Sc., C.Eng.
\$5.40

The purpose of this book is to introduce the LM3900 to the Technician, Experimenter and the Hobbyist. It provides the groundwork for both simple and more advanced uses, and is more than just a collection of simple circuits or projects.

Simple basic working circuits are used to introduce this IC. The LM3900 can do much more than is shown here, this is just an introduction. Imagination is the only limitation with this useful and versatile device. But first the reader must know the basics and that is what this book is all about.

223: 50 PROJECTS USING IC CA3130
R.A. PENFOLD
\$5.00

In this book, the author has designed and developed a number of interesting and useful projects which are divided into five general categories: I — Audio Projects II — R.F. Projects III — Test Equipment IV — Household Projects V — Miscellaneous Projects.

224: 50 CMOS IC PROJECTS
R.A. PENFOLD
\$3.75

CMOS IC's are probably the most versatile range of digital devices for use by the amateur enthusiast. They are suitable for an extraordinary wide range of applications and are also some of the most inexpensive and easily available types of IC.

Mr. R.A. Penfold has designed and developed a number of interesting and useful projects which are divided into four general categories: I — Multivibrators II — Amplifiers and Oscillators III — Trigger Devices IV — Special Devices.

THE ACTIVE FILTER HANDBOOK
TAB No.1133
\$13.95

Whatever your field — computing, communications, audio, electronic music or whatever — you will find this book the ideal reference for active filter design.

The book introduces filters and their uses. The basic math is discussed so that the reader can tell where all design equations come from. The book also presents many practical circuits including a graphic equalizer, computer tape interface and more.

DIGITAL ICS — HOW THEY WORK AND HOW TO USE THEM
A8004
\$10.95

An excellent primer on the fundamentals of digital electronics. This book discusses the nature of gates and related concepts and also deals with the problems inherent to practical digital circuits.

MASTER HANDBOOK OF 1001 PRACTICAL CIRCUITS
TAB No.800
\$19.95
MASTER HANDBOOK OF 1001 MORE PRACTICAL CIRCUITS
TAB No.804
\$23.95

Here are transistor and IC circuits for just about any application you might have. An ideal source book for the engineer, technician or hobbyist. Circuits are classified according to function, and all sections appear in alphabetical order.

THE MASTER IC COOKBOOK
TAB No.1199
\$17.95

If you've ever tried to find specs for a so called 'standard' chip, then you'll appreciate this book. C.L. Hallmark has compiled specs and pinout for most types of ICs that you'd ever want to use.

ELECTRONIC DESIGN WITH OFF THE SHELF INTEGRATED CIRCUITS
AB016
\$12.95

This practical handbook enables you to take advantage of the vast range of applications made possible by integrated circuits. The book tells how, in step by step fashion, to select components and how to combine them into functional electronic systems. If you want to stop being a "cookbook hobbyist", then this is the book for you.

BP117: PRACTICAL ELECTRONIC BUILDING BLOCKS
BOOK 1
\$7.60

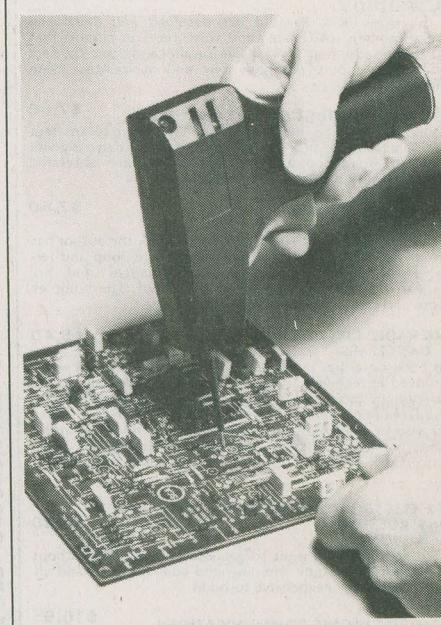
Virtually any electronic circuit will be found to consist of a number of distinct stages when analysed. Some circuits inevitably have unusual stages using specialised circuitry, but in most cases circuits are built up from building blocks of standard types.

This book is designed to aid electronics enthusiasts who like to experiment with circuits and produce their own projects rather than simply follow published project designs.

The circuits for a number of useful building blocks are included in this book. Where relevant, details of how to change the parameters of each circuit are given so that they can easily be modified to suit individual requirements.

PH253: ELECTRONIC DESIGN WITH OFF-THE-SHELF INTEGRATED CIRCUITS
Z. MEIKEIN & P. TACKRAY
\$12.95

A real help for do-it-yourselfers, this handy guide tells professionals and hobbyists alike, how to take components off the shelves, arrange them into circuitry, and make any system perform its desired function.



Electronics

RADIO AND COMMUNICATIONS

BP79: RADIO CONTROL FOR BEGINNERS \$6.80
F.G. RAYER, T.Eng. (CEI), Assoc. IERE.

The aim of this book is to act as an introduction to Radio Control for beginners to the hobby. The book will commence by dealing with the conditions that are allowable for such things as frequency and power of transmission. This is followed by a "block" explanation of how control-device and transmitter operate and receiver and actuator(s) produce motion in a model.

Details are then given of actual solid state transmitting equipment which the reader can build. Plain and loaded aerials are then discussed and so is the field-strength meter to help with proper setting up.

The radio receiving equipment is then dealt with which includes a simple receiver and also a crystal controlled superhet. The book ends with the electro-mechanical means of obtaining movement of the controls of the model.

BP96: CB PROJECTS \$7.60
R.A. PENFOLD

Projects include speech processor, aerial booster, cordless mike, aerial and harmonic filters, field strength meter, power supply, CB receiver and more.

222: SOLID STATE SHORT WAVE RECEIVERS FOR BEGINNERS \$4.70
R.A. PENFOLD

In this book, R.A. Penfold has designed and developed several modern solid state short wave receiver circuits that will give a fairly high level of performance, despite the fact that they use only relatively few and inexpensive components.

BP91: AN INTRODUCTION TO RADIO DXing \$7.60

This book is divided into two main sections one to amateur band reception, the other to broadcast bands. Advice is given to suitable equipment and techniques. A number of related constructional projects are described.

BP105: AERIAL PROJECTS \$7.60
R.A. PENFOLD

The subject of aerials is vast but in this book the author has considered practical designs including active, loop and ferrite aerials, which give good performances and are reasonably simple and inexpensive to build. The complex theory and math of aerial design are avoided.

BP46: RADIO CIRCUITS USING IC's \$5.40
J.B. DANCE, M.Sc.

This book describes integrated circuits and how they can be employed in receivers for the reception of either amplitude or frequency modulated signals. The chapter on amplitude modulated (a.m.) receivers will be of most interest to those who wish to receive distant stations at only moderate audio quality, while the chapter on frequency modulation (f.m.) receivers will appeal to those who desire high fidelity reception.

BP92: ELECTRONICS SIMPLIFIED - CRYSTAL SET CONSTRUCTION \$6.80
F.A. WILSON

Aimed at those who want to get into construction without much theoretical study. Homewound coils are used and all projects are very inexpensive to build.

PH245: ELECTRONIC COMMUNICATIONS \$16.95
 Covers amplitude modulation, AM and FM transmitters, pulse modulation, and antennas. Includes discussions of applications.

BP70: TRANSISTOR RADIO FAULT-FINDING CHART \$1.90
CHAS. E. MILLER

Across the top of the chart will be found four rectangles containing brief descriptions of various faults; vis: — sound weak but undistorted; set dead; sound low or distorted and background noise. One then selects the most appropriate of these and following the arrows, carries out the suggested checks in sequence until the fault is cleared.

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AUDIO

BP90: AUDIO PROJECTS \$7.60
F.G. RAYER

Covers in detail the construction of a wide range of audio projects. The text has been divided into preamplifiers and mixers, power amplifiers, tone controls and matching and miscellaneous projects.

205: FIRST BOOK OF HI-FI LOUDSPEAKER ENCLOSURES \$3.05
B.B. BABANI

This book gives data for building most types of loudspeaker enclosure. Includes corner reflex, bass reflex, exponential horn, folded horn, tuned port, klipschorn labyrinth, tuned column, loaded port and multi speaker panoramic. Many clear diagrams for every construction showing the dimensions necessary.

BP47: MOBILE DISCOTHEQUE HANDBOOK \$5.40
COLIN CARSON

The vast majority of people who start up "Mobile Discos" know very little about their equipment or even what to buy. Many people have wasted a "small fortune" on poor, unnecessary or badly matched apparatus.

The aim of this book is to give you enough information to enable you to have a better understanding of many aspects of "disco" gear.

HOW TO BUILD A SMALL BUDGET RECORDING STUDIO FROM SCRATCH... \$15.95
TAB No.1166

The author, F. Alton Everest, has gotten studios together several times, and presents twelve complete, tested designs for a wide variety of applications. If all you own is a mono cassette recorder, you don't need this book. If you don't want your new four track to wind up sounding like one, though, you shouldn't be without it.

BP51: ELECTRONIC MUSIC AND CREATIVE TAPE RECORDING \$5.00
M.K. BERRY

Electronic music is the new music of the Twentieth Century. It plays a large part in "pop" and "rock" music and, in fact, there is scarcely a group without some sort of synthesiser or other effects generator.

This book sets out to show how electronic music can be made at home with the simplest and most inexpensive of equipment. It then describes how the sounds are generated and how these may be recorded to build up the final composition.

BP74: ELECTRONIC MUSIC PROJECTS \$7.20
R.A. PENFOLD

Although one of the more recent branches of amateur electronics, electronic music has now become extremely popular and there are many projects which fall into this category. The purpose of this book is to provide the constructor with a number of practical circuits for the less complex items of electronic music equipment, including such things as a Fuzz Box, Waa-Waa Pedal, Sustain Unit, Reverberation and Phaser-Units, Tremolo Generator etc.

BP81: ELECTRONIC SYNTHESISER PROJECTS \$6.80
M.K. BERRY

One of the most fascinating and rewarding applications of electronics is in electronic music and there is hardly a group today without some sort of synthesiser or effects generator. Although an electronic synthesiser is quite a complex piece of electronic equipment, it can be broken down into much simpler units which may be built individually and these can then be used or assembled together to make a complete instrument.

ELECTRONIC MUSIC SYNTHESIZERS \$10.95
TAB No.1167

If you're fascinated by the potential of electronics in the field of music, then this is the book for you. Included is data on synthesizers in general as well as particular models. There is also a chapter on the various accessories that are available.

Tab1364: DESIGNING, BUILDING AND TESTING YOUR OWN SPEAKER SYSTEM... WITH PROJECTS \$13.95

Covers the theory of speaker construction and describes a variety of plans for speaker system projects ranging from simple setups to complex multi-driver systems. Enclosure design is covered in very good detail.

BP68: CHOOSING AND USING YOUR HI-FI \$6.75
MAURICE L. JAY

The main aim of this book is to provide the reader with the fundamental information necessary to enable him to make a satisfactory choice from the extensive range of hi-fi equipment now on the market.

Help is given to the reader in understanding the equipment he is interested in buying and the author also gives his own opinion of the minimum standards and specifications one should look for. The book also offers helpful advice on how to use your hi-fi properly so as to realise its potential. A Glossary of terms is also included.

TEST EQUIPMENT

BP75: ELECTRONIC TEST EQUIPMENT \$6.80
F.G. RAYER, T.Eng. (CEI), Assoc. IERE

This book covers in detail the construction of a wide range of test equipment for both the Electronics Hobbyists and Radio Amateur. Included are projects ranging from an FET Amplified Voltmeter and Resistance Bridge to a Field Strength Indicator and Heterodyne Frequency Meter. Not only can the home constructor enjoy building the equipment but the finished projects can also be usefully utilised in the furtherance of his hobby.

99 TEST EQUIPMENT PROJECTS YOU CAN BUILD \$15.95
TAB No.805

An excellent source book for the hobbyist who wants to build up his work bench inexpensively. Projects range from a simple signal tracer to a 50MHz frequency counter. There are circuits to measure just about any electrical quantity: voltage, current, capacitance, impedance and more. The variety is endless and includes just about anything you could wish for!

HOW TO GET THE MOST OUT OF LOW COST TEST EQUIPMENT \$9.95
AB017

Whether you want to get your vintage 1960 'TestRite' signal generator working, or you've got something to measure with nothing to measure it with, this is the book for you. The author discusses how to maximize the usefulness of cheap test gear, how to upgrade old equipment, and effective test set ups.

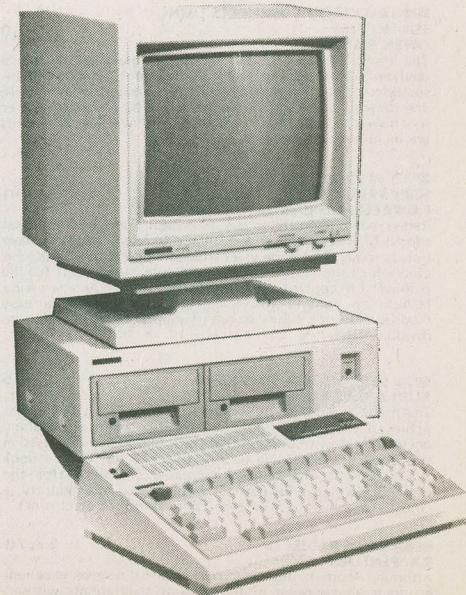
THE POWER SUPPLY HANDBOOK \$15.95
TAB No.806

A complete one stop reference for hobbyists and engineers. Contains high and low voltage power supplies of every conceivable type as well as mobile and portable units.

PH246: ELECTRONIC TEST EQUIPMENT \$19.95
 Covers analog and digital meters, oscilloscopes, frequency generation and measurement, and special measuring instruments.

Tab1532: THE COMPLETE BOOK OF OSCILLOSCOPES \$19.95

This totally up-to-date handbook is both an in-depth reference source and a practical applications guide. Information is included on both ordinary service and laboratory 'scopes, waveform analysis, vectors, vectoroscopes, high and low frequency analysis, sampling, storage, digital scopes, and signature analysis. The author, Stan Prentiss is one of the leading technical writers in the U.S.



REFERENCE

BP85: INTERNATIONAL TRANSISTOR EQUIVALENTS GUIDE

ADRIAN MICHAELS \$11.75

This book will help the reader to find possible substitutes for a popular user-orientated selection of modern transistors. Also shown are the material type, polarity, manufacturer selection of modern transistors. Also shown are the material type, polarity, manufacturer and use. The Equivalents are sub-divided into European, American and Japanese. The products of over 100 manufacturers are included. An essential addition to the library of all those interested in electronics, be they technicians, designers, engineers or hobbyists. Fantastic value for the amount of information it contains.

BP108: INTERNATIONAL DIODE EQUIVALENTS GUIDE

ADRIAN MICHAELS \$7.85

This book is designed to help the user in finding possible substitutes for a large user orientated selection of the many different types of semiconductor diodes that are available today. Besides simple rectifier diodes also included are Zener diodes, LEDs, Diacs, Triacs, Thyristors, Photo diodes and Display diodes.

BP1: FIRST BOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES

B.B. BABANI \$2.30

This guide covers many thousands of transistors showing possible alternatives and equivalents. Covers transistors made in Great Britain, USA, Japan, Germany, France, Europe, Hong Kong, and includes types produced by more than 120 different manufacturers.

BP14: SECOND BOOK OF TRANSISTOR EQUIVALENTS AND SUBSTITUTES

B.B. BABANI \$4.30

The "First Book of Transistor Equivalents" has had to be reprinted 15 times. The "Second Book" produced in the same style as the first book, in no way duplicates any of the data presented in it. The "Second Book" contains only additional material and the two books complement each other and make available some of the most complete and extensive information in this field. The interchangeability data covers semiconductors manufactured in Great Britain, USA, Germany, France, Poland, Italy, East Germany, Belgium, Austria, Netherlands and many other countries.

TOWER'S INTERNATIONAL OP-AMP LINEAR IC SELECTOR

TAB No.1216 \$12.95

This book contains a wealth of useful data on over 5,000 Op-amps and linear ICs — both pinouts and essential characteristics. A comprehensive series of appendices contain information on specs, manufacturers, case outlines and so on.

CMOS DATABOOK

TAB No.984 \$9.45

There are several books around with this title, but most are just collections of manufacturers' data sheets. This one, by Bill Hunter, explains all the intricacies of this useful family of logic devices . . . the missing link in getting your own designs working properly. Highly recommended to anyone working with digital circuits.

Tab1538: ELECTRONIC DATABOOK — 3RD EDITION

\$29.50

Any electronic job will be easier and less time consuming when you have instant access to exactly the nomogram, table, chart or formula you need, when you need it. All this and much more is included in this completely revised and updated version of one of the most respected information source in the electronics field. Generously indexed, this handbook is divided into six sections: Frequency Data; Communication; Passive Components; Active Components; Mathematical Data; Formulas and Symbols and Physical Data.

Tab1516: TOWERS INTERNATIONAL MICROPROCESSOR SELECTOR

\$30.95

Towers Selector books have gained an international reputation for completeness and usefulness. This volume gives you all the data you will normally need to select the right chip.

ROBOTICS

THE COMPLETE HANDBOOK OF ROBOTICS

TAB No.1071 \$15.95

All the information you need to build a walking, talking mechanical friend appears in this book. Your robot can take many forms and various options — light, sound, and proximity sensors — are covered in depth.

HOW TO BUILD YOUR OWN SELF PROGRAMMING ROBOT

TAB No.1241 \$13.95

A practical guide on how to build a robot capable of learning how to adapt to a changing environment. The creature developed in the book, Rodney, is fully self programming, can develop theories to deal with situations and apply those theories in future circumstances.

Tab1421: HANDBOOK OF ADVANCED ROBOTICS

\$23.95

Here's the key to learning how today's sophisticated robot machines operate, how they are controlled, what they can do and how you can put this modern technology to work. Also included are details on building your own hobby robot.

BUILD YOUR OWN WORKING ROBOT

TAB No.841

Contains complete plans — mechanical, schematics, logic diagrams and wiring diagrams — for building Buster. Buster is a sophisticated experiment in cybernetics you can build in stages. There are two phases involved: first Buster is lead led, dependent on his creator for guidance; the second phase makes Buster more independent and able to get out of tough situations.

VIDEO

BP100: AN INTRODUCTION TO VIDEO

D.K. MATHEWSON

Presents in as non-technical a way as possible how a video recorder works and how to get the best out of it and its accessories. Among the items discussed are the pros and cons of the various systems, copying and editing, international tape exchange and understanding specifications.

Tab1519: ALL ABOUT HOME SATELLITE TELEVISION

Covers such aspects as where to buy, problems in setting up your TVRO station and how to solve them, antenna siting and equipment selection.

Tab1490: VIDEO CASSETTE RECORDERS: BUYING, USING AND MAINTAINING

A complete handbook for the video enthusiast. You'll learn about how the systems work and how to choose as well as take a technical look at the inside workings. There are also sections on making your own video recordings.

MISCELLANEOUS

BP101: HOW TO IDENTIFY UNMARKED IC'S

K.H. RECORR

Originally published as a feature in 'Radio Electronics', this chart shows how to record the particular signature of an unmarked IC using a test meter, this information can then be used with manufacturer's data to establish the application.

AUDIO AND VIDEO INTERFERENCE CURES

KAHANER

HB21

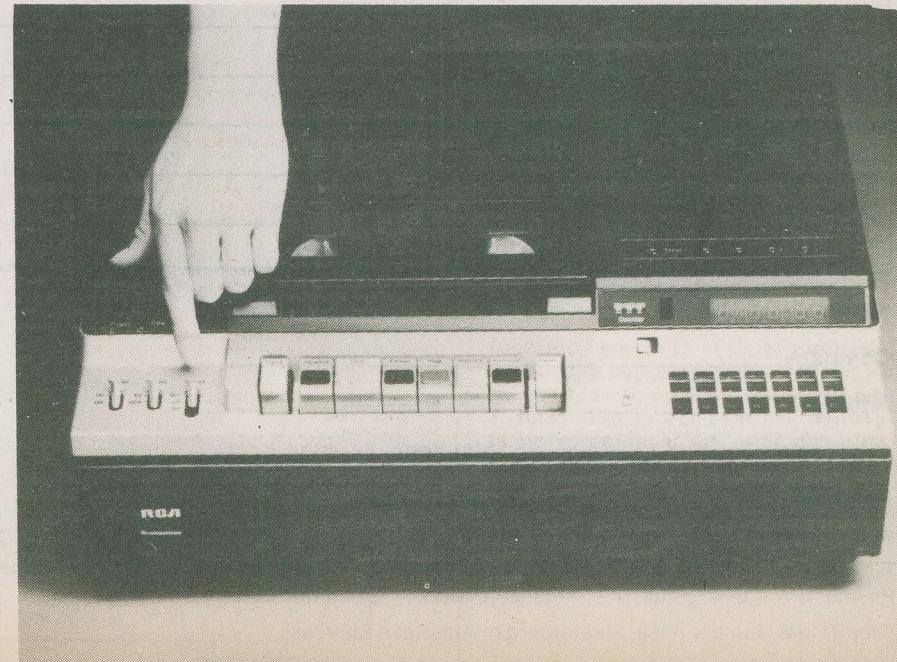
A practical work about interference causes and cures that affect TV, radio, hi-fi, CB, and other devices. Provides all the information needed to stop interference. Schematic wiring diagrams of filters for all types of receivers and transmitters are included. Also, it supplies simple filter diagrams to eliminate radio and TV interference caused by noisy home appliances, neon lights, motors, etc.

BASIC TELEPHONE SWITCHING SYSTEMS

TALLEY

HB27

The Revised Second Edition of this book, for trainee and engineer alike, includes updated statistical data on telephone stations, and new and improved signaling methods and switching techniques. It also includes E & M signaling interface for electronic central offices and automatic number identification methods used in step-by-step, panel and crossbar central offices.



See back page of catalogue for ordering details. No taxes apply to books.

INTERRELATED INTEGRATED ELECTRONICS CIRCUITS FOR THE RADIO AMATEUR, TECHNICIAN, HOBBYIST AND

CB'ER MENDELSON

HB29

This book provides a variety of appealing projects that can be constructed by anyone from the hobbyist to the engineer. Construction details, layouts, and photographs are provided to simplify duplication. While most of the circuits are shown on printed circuit boards, every one can be duplicated on hand-wired, perforated boards. Each project is related to another projects so that several may be combined in a single package. The projects, divided into five major groups, include CMOS audio modules, passive devices to help in benchwork, test instruments, and games.

BASIC CARRIER TELEPHONY, THIRD EDITION

TALLEY

HB28

\$15.95

A basic course in the principles and applications of carrier telephony and its place in the overall communications picture. It is abundantly illustrated, with questions and problems throughout, and requires a minimum of mathematics.

Tab1309: THE ACOUSTIC AND ELECTRIC GUITAR REPAIR HANDBOOK

\$24.50

Literally everything the amateur or professional musician needs to know to properly maintain his instruments, plus all the how-to's for making repairs from simple tuning to major overhauls.

BP110: HOW TO GET YOUR ELECTRONIC PROJECTS WORKING

R.A. PENFOLD

We have all built circuits from magazines and books only to find that they did not work correctly, or at all, when first switched on. The aim of this book is to help the reader overcome just these problems by indicating how and where to start looking for many of the common faults that can occur when building up projects.

ELECTRONIC TROUBLESHOOTING HANDBOOK

A8019

\$11.95

This workbench guide can show you how to pinpoint circuit troubles in minutes, how to test anything electronic, and how to get the most out of low cost test equipment. You can use any and all of the time-saving shortcuts to rapidly locate and repair all types of electronic equipment malfunctions.

COMPLETE GUIDE TO READING SCHEMATIC DIAGRAMS

A8018

\$9.95

A complete guide on how to read and understand schematic diagrams. The book teaches how to recognize basic circuits and identify component functions. Useful for technicians and hobbyists who want to avoid a lot of headscratching.

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Some advertising claims that the automated office is with us now. It is not. Nor is it in sight.

The industry is beset with anomalies. At the higher levels many aspects of office automation work well. For instance our current technology enables multi-nationals to communicate and interchange data, text and graphics as easily as making a local phone call.

Would that it were as simple with small systems.

It is for instance, uncommon to be able to move data from one computer program to another. Nor may the ubiquitous 5 1/4" floppy disks generally be interchanged between machines of different makes. They fit mechanically but not electronically. It is not necessarily possible to inter-connect or exchange data between machines, similar or otherwise: a situation exacerbated by lack of industry standards. There is no industry agreement on the topography, let alone the mechanical and electrical specifications, for connecting computers and peripherals in networks.

Equipment manufacturers add to the problems. Some build in or imply non-compatibility to dissuade clients from the competition. Others resist supplying the information needed to establish if substitution or interconnection is possible.

Truly excellent microcomputers and software have been developed that will benefit almost any type of business and form an ideal practical introduction to business computing. Yet on a bigger scale truly horrendous management problems remain to be overcome. Just for starters the electronic office implies distributing information to those who need it, a concept totally foreign to many 'managements'.



The Electronic Office Returns

On the positive side is the recent entry of industry giants like IBM, NCR, and Digital Equipment into the small business computer arena, causing furious and much needed re-thinking of fundamental positions in many a DP dept. These major companies will not perpetuate the myth that the 'electronic office is here right now'. They may reduce expectations, but they'll project a clearer concept of present possibilities.

Connecting

Essential to office automation is the ability to interconnect numbers and combinations of components: computers, data storage, printers, telexes and so on. This ability does not invariably exist.

At present compatibility and inter-connectability implies starting with, but not necessarily finishing with, 'made or bought from the same company'. If one intends to expand a system, or share a printer between two computers, then one must ensure it's feasible right from the start. IBM have this thoroughly sewn up with their Systems Network Architecture (or System for Negating Alternatives as disgruntled rivals call it). Developed in 1972, SNA enables a wide range of IBM and IBM compatible equipment to be connected. SNA has since been adapted by Ahmdahl, Facom, and National Semiconductor. NCR Comtel are having a try but are currently bogged down in a flurry of suits and countersuits.

... it can be difficult (and often impossible) to inter-connect two small computers in the same room!

Inter-connecting computers and peripherals over any appreciable distance is complicated. Millions and millions of bits of data have to be transmitted each second. This needs special cabling and equipment, plus a way of controlling the traffic, or of avoiding collisions.

The technology is called Local Area Networking and is one of the biggest growth areas in computing. Now, it is possible to inter-connect one thousand or so computers and peripherals over an area of a few kilometres, but it's costly.

Networking is also hampered by a lack of standards. There are currently over fifty competing systems, all different. The closest there is to a standard is the largely Xerox-developed Ethernet. 3COM Corporation offers a device for connecting IBM Personal Computers to

this system for nine hundred and fifty dollars U.S.

Datapoint's ARCnet probably leads the way in terms of networks installed... about five thousand worldwide. It's slower than Ethernet but, as is the way of networks, it's cheaper, at four hundred to six hundred dollars a unit. The Tandy Corporation have just adopted ARCnet for their personal and business computers: a company spokesperson told us that they expect to "reduce the per unit connection cost to between two hundred and two hundred and fifty dollars". Ethernet, and ARCnet, like many others, require costly coaxial cable interconnection. Some networks use standard telephone cable. These are cheaper to buy and install, but inherently slower.

Complete networks may be inter-connected (if compatible), via devices known as 'gateways', and public data links. Well engineered facilities exist for interconnecting compatible devices and networks, world-wide if desired, but it can be difficult (and often impossible) to interconnect two small computers in the same room!

A recent development allows small business computers to tap into large mainframe machines. The idea is to allow authorized executives access to corporate data held therein.

Software Simplified

Most managers and executives now realize that they must acquire at least the rudiments of computing and that without this knowledge they may simply be unable to compete. And soon. It is already common for computer-literate juniors to be promoted over the top of seniors unwillingly to grasp the new technology.

Developments in hardware and software have eased acceptance. It is now unnecessary to be a computer linguist to use a business computer. Much of the new software is 'applications programs'. They provide a simple framework enabling users to generate further programs for specific needs. Some study and heartache is required but most such packages can be grasped within a day and be comfortably familiar to the user within a week.

These packages are not simplified accounting programs. They provide new or better ways of acquiring, manipulating, and using information, often enabling operations previously impracticable.

Financial Modelling

Financial modelling programs exemplify the trend. Most are an electronic equivalent of the accountant's spread-sheet. Rows and columns of data vital to a company's well-being, or otherwise;.... forecasts, budgets, variations, cash flow projections, analyses, financial reports and statements.

Electronics does the calculations. Columns and rows are totalled at extraordinary speed, as are intermediate sums. Any figure, column or row may be changed as frequently as desired (recalculation taking but a second or two), with all examples saveable in memory or printed out as required. This ability rapidly to change and re-calculate makes these programs enormously valuable to *all* businesses. No user, even contemplates working with a pencil and paper again! Apart from time saving, these programs enable 'what if' forecasts... checking the overall effects of changes in inflation, wages, taxes, rates, rentals, prices and so on or any combinations thereof. Above all they enable *optimized* budgets... a practical impossibility without. Many spread-sheet programs are available; all include functions such as averaging, indicating minimum or maximum values, logic operations, calculating net present values and so on. There are a few traps. Most provide sixty-four or one hundred and twenty-eight 'columns' and two hundred and fifty two 'rows'. But only in the ads. Computer memory limits usage to around twenty columns and one hundred rows. It's possible to prepare paper spread-sheets in sections, but not all applications or programs so allow.

Many users need to *consolidate* spread-sheets (taking data from one and adding it to another). None of the early programs and only a few current ones (such as Multiplan and the latest Visicalc and Supercalc) have this facility. Spread-sheets require a lot of computer memory. The ideal is at least one hundred and twenty-eight Kilobytes but not all programs can use that much. The minimum otherwise is sixty-four kilobytes. It is desirable for spread-sheet programs to interface directly with word-processing and data-base programs. Not all do.

Spread-sheet programs are an ideal introduction to business computing, particularly for accountants and managers. If a job's possible with a pencil, paper and calculator it can be done more accurately, neatly and many times faster with a spread-sheet program.

Apart from spread-sheets, there are also specialized financial modelling programs. These, such as Micromodeler Plus Plan, are intended for the more experienced user. They are more powerful than spread-sheet programs but far less versatile. As with all programs it is still necessary to type... even with just two fingers. Delicate egos may consider typing less threatening than unemployment.

Database Systems

Small business database systems allow information to be electronically filed, and retrieved with key words. For example, the writer has a list of companies in the computer associated industries. Each entry lists contact name and

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The Electronic Office Returns



'salutation' (Sir, Ms. Davo, Darling Kate), address, telephone number, product/s, PR contact and so on. Typing a command such as 'List for product = "line printers"' produces a listing of all companies having that product.

Retrieval commands can be incomplete. Simply typing 'List for name = "Jo"' produces all names starting with 'Jo'. List for city = 'Toro' AND product = "photoco" lists all the photocopier suppliers in Toronto. Using a couple more keyboard commands transfers selected records to another file where they may be merged with standard letters for a personalized mailing.

There are several database systems suitable for small business computers. The one described, dBASE II, accommodates up to sixty five thousand, five hundred and thirty-five entries (called records) in one 'file'. Each record may have up to thirty-two fields (name, street address, city, postal code, product, cost price, selling price, order quantity, and so on. Lists may be sorted in any order — alphabetically by name, address, state, or whatever; or numerically by postal code, street number, catalogue numbers, value of orders, and so on.

Systems such as these are known as 'relational' databases, 'relational' implying that information may be retrieved without the necessity to move through a hierarchy of other data. They are ideally suited to mail order and mailing list operations, inventory control, and sorting and indexing.

Arithmetic functions are included. An inventory application can sub-total and total

sales quantities, cost and selling prices, and print-out product data in any desired category.

Leading contenders include dBase II, FMS 80, and Dataflex. These cost between eight hundred and fourteen hundred dollars

There are several data-base systems suitable for small business computers.

and run on business machines that have the CP/M operating system. These systems consume storage like Lady Di's wardrobe. Large data-bases will require hard disk storage.

Less ambitious but still powerful, systems include DB Master (for the Apple II), Tandy's Profile (for the TRS-80 range), and DMS (Commodore and computers with the CP/M 86 operating systems). These latter packages cost between three and four hundred dollars. They may prove inadequate for large scale information storage and retrieval but are fine for most office management purposes.

Word Processing

In the beginning was the word. And the word was with Wang. Or maybe IBM.

Word processors were originally 'dedicated' computers, machines working as word-processors and nothing else: many still are. A few now include numerical data processing.

The practice is still not understood by all potential users, as many are still perceiving it as a higher form of typing. It partially is in that it can produce totally clean copy. But so can a top typist... and quicker.

A word processor's main advantage is its ability to store, retrieve and manipulate large blocks of text, and to combine text from different files, for example personalizing letters by combining a standard letter and a mailing list. Word processors are not substitutes for typewriters, the latter are better suited for general business correspondence.

As personal computers became increasingly adopted for business use it made sense to use them for word processing too. Now, every computer on the market has at least one associated word processing program, with varying degrees of versatility and ease of use.

Packages

Wordstar is the best known. It's cumbersome to use and while it stops short of physically attacking the user, not even its most ardent admirers would call it 'user-friendly'. But it's versatile and has few limitations. Once it is learned its awkwardness is forgiven. A big plus is its ability to interface with other programs including spread-sheet and data-base systems. *Wordstar* costs about six hundred dollars. It will run on innumerable machines. *Spellstar*, a spelling checker, with expandable dictionary is two hundred and forty dollars more. The instructional manual is hard to follow but there are several excellent independently written manuals.

Spellbinder from Lexisoft in California, combines all required word processing functions plus facilities normally limited to 'office management' software. For example it can select and sort in nineteen different categories. The program is harder to learn and use than some, but the effort seems worthwhile. Cost is about five hundred and seventy-five dollars plus three hundred and fifty-five dollars for the optional *Spellcheck* program. *Spellbinder* runs on machines with CP/M 80 or 86 but requires at least thirty-two kilobytes of memory.

Benchmark is one of the latest contenders. The program can merge files (possible by buying further software with some other programs), and has a range of arithmetic operations. An unusual and valuable feature is a 'library file' which stores sections of text up to two thousand characters. These phrases may each be assigned to twenty-six alphabetical keys in both upper and lower case. Any of fifty-two stored paragraphs or phrases can be selected and entered by pressing the appropriate key. *Benchmark* runs on CP/M 86 machines and costs six hundred and twenty-five dollars.

Word processing on general purpose

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The Electronic Office Returns

computers involves varying levels of compromise in ease of use. Dedicated word processors have various keys to select commonly used formats, such as line length, paragraph indent, underlining, bold type, and the like. With most word processing programs these formats are selected by depressing two or more keys. (Spellbinder is an exception... the program is tailored for specific computers and takes advantages of otherwise unused keys).

In practice, dedicated word processors are faster, and easier to learn and use. But the ability to use various other types of programs on general purpose machines can be so valuable that the minor nuisances encountered when word processing are readily accepted.

Productivity

Meaningful or otherwise, 'office productivity' is a selling buzz-phrase. It's consequently used a great deal by equipment vendors, usually in the context of time and staff required for typing, communication, filing and retrieving information and preparing the payroll.

In some circumstances 'office productivity' is definable and measurable. For instance, a word-processor's ability to store and retrieve blocks of copy, plus easing corrections, will enable a legal typist to produce quicker, cleaner documents. Here, productivity is demonstrably increased. But business offices and their tasks exist to support business activities and objectives. They are not an end in themselves. There is rarely an input or output so conventional concepts of 'productivity' are inapplicable. Benefits may well follow the introduction of technology, but not be measurably attributable in terms of productivity.

A data-base used to provide fast accurate management information may enhance a company's business out of all proportion to the time saved, or otherwise, by the office staff directly involved. Office 'productivity' perhaps even falls, but company productivity and profitability increases. Computer invoicing may not reflect a productivity increase but the ability to present accounts earlier may improve cash flow.

Don't take all 'office productivity' data at face value: some 'objective' measurements are clearly suspect. A 'keystroke' survey many years ago, was later found useless. The typists had increased 'output' by using the space bar instead of the tabulation keys!

One company claimed its electronic typewriters would increase a secretary's productivity up to twenty percent, and projected salary savings pro rata. But innumerable surveys have shown that secretaries average a mere ten to fifteen percent of their time typing. The real time saving is at best three percent, insufficient even to pay for the machine. There are various sound reasons for giving secretar-



ies electronics typewriters but cost savings through enhanced productivity is well down the list.

On a broad scale though there seems ample (anecdotal) evidence to show that carefully chosen and carefully implemented office systems and software have the potential for increasing company efficiency and profitability. Particularly (perhaps even exclusively) if all who will be concerned are consulted and actively involved right from the planning stages.

Financial modelling offers the ability to optimise budgets and maintain financial controls sometimes impracticable to do any other way. A properly organized data-base can provide access to management information massively faster and more flexibly than the best manual systems. Word processing will benefit offices whose work involves handling large blocks of repetitive text and sending out large personalized mailings.

Quantifying the benefits however is difficult if not impossible. There's adequate reason for being wary of 'office productivity' claims.

Employment

So far there's little evidence that jobs have been lost by the introduction of office computer systems in general business. It is true that

word processors speed up production of certain types of text. But the machines themselves generate work not previously existing. Files must be maintained, backup copies made, new techniques mastered.

Electronic mailing, via linked computers, is faster than the memo route, but electronic memos are not necessarily quicker to produce. Executives using micro-processors may even prepare and send them themselves, thirty thousand dollar a year person doing seventeen thousand dollar a year function, but not frequently enough to jeopardize jobs! The general experience is that office automation may enable existing staff to do more or better tasks, but it does not usually enable fewer staff to do the same tasks.

Clearly there will be exceptions, particularly in offices currently having no mechanization, but as a generalization computers do not appear to be a major threat to employment in small to medium sized general offices during the next few years.

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The Macintosh Revealed



Hark... another new Apple has emerged from the high tech garages of California. Not a Granny Smith, no, not a Golden Delicious, no... it's... it's...

by Steve Rimmer

The Lisa we looked at last issue had a lot to say for itself... in really neat high resolution graphic type with icons and other virtual paraphernalia. However, it had that one serious drawback that plagues too many great inventions in these technological times... it cost the moon.

A secondary consideration was that it was passing huge.

Brief cosmic moments before this issue went to press we got to have a look at yet another Apple computer, the oft mentioned little freaked out cousin of Lisa, the Apple Macintosh. Very similar to the Lisa in its concept, the Macintosh is priced to look

friendly for the lower end of the market. However, in scaling Lisa down, the designers of the Macintosh have managed to retain a surprising degree of her power.

Just imagine a thirty two bit toaster and you'll begin to get some idea of what the whole works is about.

Egg MacMuffin

As a box full of parts, the Macintosh is a really hot system. Like the Lisa, it's based on the mythical Motorola 68000 processor running at eight megahertz in this configuration. It orbits the world through a high resolution nine inch black and white monitor, which, while not quite so sharp as the tube in the Lisa, is still attractive. It has a sophisticated user interface which supports the same sort of mouse activity the Lisa gets so worked up over.

The disk drives on the Macintosh are also scaled down... they accept the new three inch disks that snuck out of Japan about a year ago. These things aren't bad... they can hold about four hundred kilobytes each. They also aren't that expensive. Apple maintains that they'll be available for about

fifty dollars for a box of ten by the time the Macintosh hits civilization. The drives themselves are made by Sony with a custom controller designed by Apple. Double sided drives, which will expand the storage capacity of the system by a factor of two, are expected in the fullness of time.

The basic Macintosh comes with one hundred and twenty eight kilobytes of memory, although the lads at Apple have promised to pack a half megabyte into the little fruit as soon as the dreamt of sixty four K memory chips show up... probably in early 1985.

The motherboard of the Macintosh features absolutely no expansion or peripheral slot connectors. Unlike the case of the Apple II, you aren't actually encouraged to rip the top off the Macintosh and heave stuff into it. Instead, the system has a pair of high speed serial ports hanging off it which are intended to drive any peripheral bitsies which one feels necessary to the fulfillment of reality.

You can also make it blast away at an external video monitor and at your ears through a four voice sound synthesizer. A voice synthesis package is promised within the next pico-eon.

Special Sauce

The Macintosh is very similar to Lisa in its concept. It uses a virtual desktop model for its screen, the visual icons that made the Lisa such a trip to photograph, to delineate its functions and a very user friendly design throughout. Unlike the Lisa, the Macintosh is pretty well a one task machine... it isn't intended to handle multiple functions at once in the way the Lisa is.

The Macintosh is intended for use as a "knowledge worker's tool"... essentially an information manager. In this sense, it is very much unlike most other personal computers in that one really doesn't have to know anything about computers to use it... one only has to understand applications. If one has a job in which one walks in some morning to find a Macintosh smiling back from the old desk, one probably already understands these.

The system could be said to be workable by idiots. In fact, it's probably more appropriate to say that it's workable by computer idiots... individuals with expertise in their own areas and no desire to become particularly good at handling computers as well. The software which Apple has released for the system has two fundamentally powerful aspects to it for computerphobes and other non-technological heads. First off, everything is done visually. That is, if you want to move a thing... block

of text, file, image, pot of moustache wax... from here to there, you don't have to type a mysterious command to make it happen and then hope. You simply move an on screen pointer to indicate the victim of your intended action, click a button to get the computer's attention and then point to where you want it to go.

Zoom... it just goes, y' know...

This visual thing is carried on throughout the architecture of the software. Almost every common function, whether it is invoking the word processor or seeing what's on the disk, is done by pointing to a picture on the screen. The system can be gotten into in minutes and mastered in an hour or two.

The second important feature about all this is that there is a high degree of consistency in the nature of the commands which make the Macintosh do its stuff from application to application. Thus, one can learn the commands for one program and apply them to all the others.

The application programs which Apple

has supplied for the Macintosh are similar to what is available for the Lisa... in fact, one suspects that the former was crunched out of the source for the latter. There is MacWrite, the word processor, MacDraw, a graphics package, MacProject, a time management program, MacTerminal, a telecommunications system and several programming languages and tools, including an assembler and debugger, BASIC, Pascal and Logo.

There are also about a hundred third party applications packages which are expected to be available shortly. Because of the similarity between the Macintosh and the Lisa, a lot of the software just emerging for the Lisa is being immediately distilled down for the Mac.

Hungry Little Fruit

The Macintosh is small... about a foot wide... and eminently suited to a desktop environment. It can be used quickly and efficiently by a wide variety of humans without three

years of prior education. It is, overall, a nicely worked out thing, well supported and really very sharp.

Unlike the Lisa, it's also not too ravenous. The Canadian prices for the system have not been revealed as of this writing; the American Mac comes in at about twenty five hundred dollars. The system is expected to be in fairly short supply until the middle of 1984.

This one is more fun than a glue gun and a room full of cats.

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Polish That Buffer



The internals of CP/M are weird and varied. They make no sense if you don't live in a fourth dimensional ghetto in Los Angeles. However, now and then you can grab onto a little bit of one and drag it into the light.

by Steve Rimmer

One of the really handy aspects of CP/M is the console command buffer. Its location and use is a bit obscure... it's never even mentioned in the documentation, such as it is, but there are heaps of useful things you can do with this aspect of the operating system.

Generally, they all take the form of filling it with characters of one sort or another.

The neat thing about the CCP buffer is that the characters you fill it with can be interpreted by the system as actual commands. Unlike regular commands, these things don't have to be given by a human. You can make them happen while under program control, thus allowing one program to call another. This is not, ordinarily, an easy thing to do.

Let us, then, consider the CCP buffer. It's a royal pain to use, but, once you get the hang of it, it can become a really decent programming tool.

Ultraboot

The CCP buffer lives in the first page of the CCP proper. Expressed as code, it would be

```
JMP COMM :PROCESS THE  
JMP NOCOMM :DEFAULT  
BUFFER DB 7FH :DON'T PROCESS  
CHRS DB 0 :THE DEFAULT  
BLANK DB :MAXIMUM LENGTH  
CRIGHT DB :OF BUFFER  
'COPYRIGHT 1979 (C) DIGITAL  
RESEARCH :16 BLANKS
```

This is all really very profound once you understand what it's up to.

Harkening back to the "Things that go JMP in the Night" article in the September issue of CNI!, you may recall the CP/M buffered console input function, which also goes under the pen name of function ten. With function ten, you set up a bit of RAM, to wit, the buffer, in which the first byte holds the maximum number of characters allowed in the buffer, the second the number which are actually in it... zero at first... and the rest the eventual bits and bytes themselves.

Function ten then accepts console input and stores it in the buffer for you.

Well, as you may have discerned, CP/M uses this function for itself as well as offering it up for public consumption. When you type in a command line, you are typing into a buffer which CP/M has set up in the first page of its console command processor, the thing above. The 7FH is the maximum number of characters you are allowed to have on a command line. The CHRS byte will be filled with the number of

Program 1

```
A>TYPE COM.ASM
: LOCATE THE CCP
: MAKE IT BOOT A PROGRAM
: ORG 0100H
:
: LHLD 1      ;GET POINTER TO BIOS JUMP TABLE
: MVI L,0    ;POINT TO BEGINNING OF THAT PAGE
: MOV A,H
: SUI 16H
: MOV H,A    ;SUBTRACT SIXTEEN PAGES, POINT TO CCP
: SHLD CCP   ;SAVE LOCATION OF START OF CCP
: LXI D,COMMAND
: LXI B,MARKER-COMMAND+2 ;# OF CHARACTERS
: MVI L,7    ;POINT TO COMMAND BUFFER
: CALL MOVCOM ;MOVE COMMAND
: LHLD CCP
: MVI L,88H  ;POINT TO LSB OF CCP POINTER
: MVI A,8
: MOV M,A    ;PUT B IN IT
: LHLD CCP
: MVI L,89H  ;POINT TO USB OF CCP POINTER
: MOV A,H
: MVI M,A
: LHLD CCP   ;GET LOCATION OF CCP
: PCHL      ;FILL PROGRAM COUNTER WITH IT
:
: MOVCOM:
: LDAX D      ;GET BYTE FROM COMMAND
: MOV M,A    ;PUT IT IN THE BUFFER
: INX H      ;POINT TO NEXT LOCATION IN BUFFER
: INX D      ;POINT TO NEXT LOCATION IN COMMAND
: DCX B      ;DECREMENT COUNTER
: MOV A,B    ;GET COUNTER IN A
: ORA C
: JNZ MOVCOM
: RET
:
: CCP DS    2
: COMMAND DB 04,'HELP',0,0,0,0,0,0,0
: COMMAND DB 19,'B:MBASIC B:FINDBOOT',0,0,0,0,0,0,0,0
: MARKER DB 0,0,0,0
:
: END
```

characters you have typed when you enter a RETURN and the thing leaps back to CP/M with your command.

The copyright notice is actually flotsam... it gets printed when the system cold boots, and is thereafter ignored. It has no function in the working of the CCP... the authors of CP/M just figured that this was a neat place to store it. Command strings longer than sixteen characters in length will overwrite it, but this doesn't really matter. The CHRS value will always point to the end of the command string, excluding the remnants of the copyright notice, so it will never get misinterpreted as valid command line data.

However, we can use the copyright in some types of meddling with this buffer. Hang on a sec.

The other things in this section which matter are the two jumps at the very start of the CCP. They point to two routines, one which processes a command which is stored in the buffer and then returns to CP/M, and the other which just returns. Under most cases, CP/M will jump to the second one, the one which ignores the command in the buffer. It reserves the first jump for processing console input. It's actually very difficult to change its mind on this matter... it's a lot easier to fool it.

If you want to make sure that the CCP always processes the contents of its buffer, the two jumps are always made to point to the same place... the processing routine. Once again, we'll be back to this.

Programmatic control of this buffer involves simply placing characters into it, ad-

justing the CHRS value to reflect the number of characters in place and then making sure that the CCP uses the processing routine, instead of the non-processing one, to return to CP/M.

Commands

The first program shown here, aptly entitled program one, is a chaining routine. In fact, while it is shown here as a stand alone program, it is probably most useful as part of a larger application.

This program runs another program. More correctly, when run, it issues a command line which, hopefully, makes enough sense to CP/M to cause it to make another program happen.

This is a good thing to be able to do under program control. Suppose you have a program which, upon finishing, wants to go to another program. For example, AP-DIAL, the enhanced version of the dialing terminal program featured in the December issue of Computing Now!, allows you to exit its terminal mode and run MODEM7, a file transferring program, all with one menu selection. This is considerably easier than having to type MODEM7 every time you want to jump from one program to the next.

This thing has two functions. First it has to find the CCP and its buffer. Then it has to load the command into the buffer and fool the CCP into thinking it has been typed in there by hand.

The CP/M system is a pretty well defined thing. You can always locate the BIOS part of it by looking at the JMP instruction at location zero in the system. This points to the page in memory where the BIOS lives. To be more specific, if you load the address after the JMP into the HL register, as we do in this program, the H will contain the page number of the beginning of the BIOS. The L will have the number of bytes in that the warm boot happens, usually three, which is meaningless for our purposes.

The CCP lives 16H, or twenty two pages below this. Subtract this from the H and you now know where the two jump instructions which start the CCP are. The buffer starts six bytes into that page.

Having done all this, making the CCP accept a programmatic command is simple. In this program, the command is held in a string with the first byte being the number of characters in the command itself. The command can, in fact, be up to a hundred and twenty seven characters long if you can think of something valid to do with that much stuff. The zero bytes at the end are terminators... CP/M will recognize a zero as being the end of the command in its buffer.

Finally, the program has to fool CP/M

Polish That Buffer

by Steve Rimmer, 29120 Bellwood
West Bend, Wisconsin 53090. He received
a degree in electrical engineering from the University of
Wisconsin at Milwaukee and now resides in
West Bend, Wisconsin.

Program 2

```
:::::::::::::::::::::::::::  
:  
:      DISK PATCHER  
:  
:      COPYRIGHT 1983 (C) STEVE RIMMER  
:  
:      STEVE RIMMER  
:  
:  
:      This program may not be sold or distributed  
:      in any commercial form without the author's  
:      written permission.  
:  
:  
BDOS EQU 0005H :WHERE BDOS LIVES  
CR EQU 13 :CARRIAGE RETURN  
LF EQU 10 :LINE FEED  
DMA EQU 00B0H :DMA ADDRESS  
TAB EQU 'I'-40H :TAB CHARACTER  
SECT EQU 1 :SECTOR TO PATCH  
TRACT EQU 1 :TRACK TO PATCH  
DRIVE EQU 0 :NUMBER OF DRIVE (0=A, 1=B, ETC)  
CNOTE EQU DMA+18H :WHERE THE COPYRIGHT NOTICE LIVES  
CBLUFF EQU DMA+7 :WHERE COMMAND GOES  
:  
ORG 0100H  
:  
LXI H,0 :SET UP LOCAL STACK  
DAD SP  
SHLD STACK  
LXI SP,STACK  
:  
CALL HELLO :PRINT HELLO MESSAGE  
CALL VCTR ;GET JUMP TABLE INTO LOCAL TABLE  
CALL GETIT :GET THE SECTOR INTO MEMORY  
JNZ RABORT ;IF BAD READ, GO AWAY  
CALL CHECKIT :SEE IF WE GOT THE RIGHT STUFF, TOM  
JNZ CABORT ;IF WRONG SECTOR, GO AWAY  
CALL PATCHIT :MAKE THE CHANGES  
CALL BURYIT :PUT NEW SECTOR BACK ON THE DISK  
JNZ WABORT :IF BAD READ, GO AWAY  
CALL OK :SAY IT'S DONE  
:  
QUIT:  
LHLD STACK :GIVE CP/M THE REAL STACK BACK  
SPHL RET :BACK TO CP/M  
:  
: *** ABORTS  
:  
RABORT:  
:ABORT FOR BAD READ  
MVI C,9  
LXI D,BADREAD  
CALL BDOS  
CALL CRLF  
JMP QUIT  
:  
:ABORT FOR BAD WRITE  
MVI C,9  
LXI D,BADWRIT  
CALL BDOS  
CALL CRLF  
JMP QUIT  
:  
:ABORT FOR WRONG SECTOR  
MVI C,9  
LXI D,BADSECT  
CALL BDOS
```

```
CALL CRLF  
JMP QUIT  
:  
:WABORT:  
:ABORT FOR BAD WRITE  
MVI C,9  
LXI D,BADWRIT  
CALL BDOS  
CALL CRLF  
JMP QUIT  
:  
: *** SUBROUTINES  
:  
:SET UP TRACK AND SECTOR POINTERS  
CALL POINT  
CALL READ  
RET  
:  
:CHECKIT:  
:MAKE SURE WE HAVE THE RIGHT SECTOR  
CALL SEECOPY ;DISPLAY THE COPYRIGHT NOTICE  
LXI H,CNOTE ;POINT TO WHERE COPYRIGHT SHOULD BE  
LXI D,CRIGHT ;POINT TO "COPYRIGHT"  
MVI B,10 ;NUMBER OF LETTERS IN "COPYRIGHT"+1  
CHKLOOP DCR B ;BUMP B  
JZ CHKDUN ;IF DONE, GO TO RETURN  
INX H ;POINT TO NEXT CHARACTER  
INX D ;AND NEXT IN COPYRIGHT  
LDAX D ;GET CHARACTER IN A  
CMP M ;COMPARE WITH WHERE H IS POINTING  
JZ CHKLOOP ;IF THEY'RE COOL, GET NEXT CHARACTER  
MVI A,1 ;SET FLAG FOR WRONG SECTOR  
CHKDUN MVI A,0 ;SET FLAG FORRIGHT SECTOR  
:  
SEECOPY:  
:DISPLAY THE COPYRIGHT NOTICE  
MVI C,9  
LXI D,CMESS  
CALL BDOS  
MVI A,'$' ;PUT END MARKER AFTER COPYRIGHT  
STA DMA+3FH ;NOTICE IN DMA BUFFER  
MVI C,9  
LXI D,CNOTE  
CALL BDOS ;PRINT THE DMA BUFFER  
CALL CRLF  
RETURN  
:  
PATCHIT:  
:PUT THE COMMAND TO BOOT IN THE SECTOR AND FUDGE JUMPS  
LXI H,DMA+8 ;POINT TO WHERE COMMAND WILL GO  
LXI D,BOOTCOM ;POINT TO WHERE COMMAND IS  
LDA BOOTCOM  
MOV B,A ;GET NUMBER OF CHARACTERS IN COMMAND  
INR B ;PLUS ONE FOR THE INDEX  
PATCHLP LDAX D ;GET A BYTES  
MOV M,A ;SEND IT HOME  
INX H ;BUMP H  
INX D ;BUMP D  
DCR B ;DECREMENT COUNTER  
JNZ PATCHLP ;IF NOT DONE, GO FOR IT  
:  
:NEW COMMAND IN PLACE  
LXI D,DMA+1 ;POINT TO FIRST VECTOR  
LXI H,DMA+4 ;POINT TO SECOND VECTOR  
LDAX D  
MOV M,A  
INX D ;COPY FIRST VECTOR
```

```

INX H ;OVER SECOND VECTOR
LDAX D
MOV M,A
;JUMP HAS BEEN FUDGED
RET
;
BURYIT:
;PUT THE PATCHED SECTOR BACK ON THE DISK
CALL POINT ;POINT TO SECTOR ON DISK
CALL WRITE ;WRITE DMA TO SECTOR
RET
;
POINT:
;SELECT DISK AND SECTOR
LXI B,0000H
MVI C,DRIVE
CALL SELECT ;SELECT DISK TO PATCH
LXI B,0000H
MVI C,TRACT
CALL TRACK ;POINT TO TRACK
LXI B,0000H
MVI C,SECT
CALL SECTOR ;POINT TO SECTOR.
RET
;
VCTR:
;GET THE VECTORS FROM THE BIOS AND PUT 'EM IN THE LOCAL TABLE
LHLD 0001H ;GET ADDRESS OF MBOOT VECTOR
LXI D,WBOOT ;POINT TO START OF LOCAL TABLE

```

```

MVI B,48 ;PUT NUMBER OF BYTES TO MOVE IN B
VLOOP: MOV A,M ;GET BYTE POINTED TO BY HL
INX H ;POINT TO NEXT BYTE OF BIOS
STAX D ;STORE BYTE IN LOCAL TABLE
INX D ;POINT TO NEXT BYTE OF TABLE
DCR B ;DECREEMNT B
JNZ VLOOP ;IF THERE ARE MORE BYTES, GO TO IT
RET
;
HELLO:
;PRINT THE HELLO MESSAGE
MVI C,9
LXI D,USES
CALL BDOS
CALL CRLF
RET
;
OK:
;SAY ALL IS WELL
MVI C,9
LXI D,OKMESS
CALL BDOS
CALL CRLF
RET
;
CRLF:
;GO TO NEW LINE
MVI C,9
LXI D,LFCR

```

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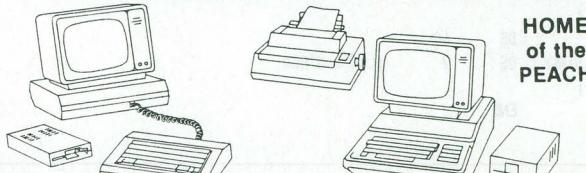
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Polish That Buffer

```

CALL    BDD5
RET
;
;-----FIXED DATA
;
LFCR  DB    CR,LF,'$'
USEMS DB    TAB,'Intelligent Disk Boot Patcher',CR,LF
          DB    TAB,'by Steve Rimmer (c) Copyright 1983$'
CMESS DB    TAB,'The copyright notice reads $'
BADREAD DB   TAB,'Argh... I can not read that sector.$'
BADSECT DB   TAB,'Argh... That is the wrong sector.$'
BADWRIT DB   TAB,'Argh... I can not write that sector.$'
CRIGHT DB   'COPYRIGHT'
BOOTCOM DB   04      ;NUMBER OF CHARACTERS IN COMMAND
          DB    'HELP'   ;COMMAND TO BOOT
OKMESS DB   TAB,'The disk is patched. Let us offer thanks to',CR,LF
          DB    TAB,'Mugumba, the god of eternal foot itch.$'
;
; LOCAL JUMP TABLE
;
WB00T: DS    3      ;WARM BOOT
CONST: DS    3      ;CONSOLE STATUS
CONIN: DS    3      ;GET CHARACTER FROM CONSOLE
CONOUT: DS   3      ;PUT CHARACTER IN CONSOLE
LIST:  DS    3      ;PUT CHARACTER IN LIST
PUN:   DS    3      ;PUT CHARACTER IN PUNCH
RDR:   DS    3      ;GET CHARACTER FROM READER
HOME:  DS    3      ;HOME SELECTED DRIVE
SELECT: DS   3      ;SELECT DISK DRIVE
TRACK: DS   3      ;SET TRACK NUMBER TO ACCESS
SECTOR: DS   3      ;SET SECTOR NUMBER TO ACCESS
SETDMA: DS   3      ;SET DMA ADDRESS
READ:  DS    3      ;READ SECTOR INTO DMA
WRITE: DS    3      ;WRITE SECTOR FROM DMA
LSTAT: DS   3      ;GET STATUS OF LST:
SECTR: DS   3      ;LOGICAL TO PHYSICAL SECTOR NUMBER
;
DS    60
STACK DS    2      ;LOCAL STACK
;
END

```

into thinking it has a command in its stomach. This basically means simply interrupting the normal flow of its operation and forcing it to proceed through its first jump instruction. Since this is also the start of the first page of the CCP, it's pretty straight forward. We simply take the location we got in the HL register before and force it into the program counter.

Down on the Disk

One of the other handy features of the CCP buffer is that it can be permanently patched to create an autobooting disk. This means that the system, as it resides on the disk, must be changed so that there is always a command in the buffer when the program warm boots and so that the CCP always does a command processing jump, which is to say, the first jump of the pair.

There are two ways to do this. The first is to pull the system from the disk into memory, patch it, and then replace it on the

disk with SYSGEN. This is tedious, not very high tech and really a drag for those users that haven't got SYSGEN... it doesn't come with all implementations of CP/M. The other way is to patch the disk directly.

You can patch the disk with a disk utility, like DU, but program two will do it automatically. It will yank the sector with the beginning of the CCP off the disk, add the command you fancy to the buffer and then replace the whole mess where it found it.

This is based on several assumptions. First off, the CCP begins on a sector boundary in most systems. That is, the first byte of the CCP resides in the first byte of a sector on the disk. Secondly, in most systems, this sector is the first sector in track one. Thirdly, 18H bytes into the sector there will be the string "COPYRIGHT", and this is the only place which it will occur in the system tracks.

This last bit is very useful. This program will not patch the sector it gets if it doesn't

find this string where it expects it, so it can't gorch your disk.

The program itself is fairly easy to follow. Really. It has several fairly obvious sequential functions. After saying hello and doing some internal patching... see "BIOS-Chemistry" in the October issue of CN! for more on this... it immediately gets the sector specified by the SECT and TRACT equates. As with all disk operations, the sector will wind up in the DMA buffer, which defaults to 80H and the one hundred and twenty eight bytes there after. It points to where it thinks the copyright notice should be and prints it. Then it looks to see if it has gotten the string "COPYRIGHT" where it expects it and, having assured itself that all is well, it patches the sector.

The CCP buffer can be patched to create an auto booting disk.

This patching stuff involves two things. First off, it has to move the command, living down at BOOTCOM, into the buffer. The first byte becomes the index to tell CP/M how many characters there are in its buffer as well as a counter for the program. Secondly, it has to patch the jumps.

The best way to make sure that CP/M uses the first jump is to give it no real choice. The program copies the vector of the first jump over the vector of the second so that no matter which one CP/M selects, it will run the routine pointed to by the first jump.

Finally, its little hands grubby with sweat and discarded bits, the program writes the sector back onto the disk where it first found it and gets lost.

This program should work on most systems. If you do have problems with it, there are several things to check. The most obvious one is that your CCP does not start at track one, sector one on the disk. In this case, you'll have to find the right sector and change the TRACT and SECT equates accordingly. If you have DU you can do it with this, or you can get the Disk Denuder

program out of the BIOS-Chemistry article and run that until it displays a sector with a copyright message.

There will be a very few systems which simply won't fancy having their CCP jumps hacked like this. If yours is one, and the system hangs when you run the program, you are probably a bit lost unless you feel like figuring out where the jumps go in your particular code... not a pleasant exercise.

It's a worthwhile trip to make sure that you give this thing its inaugural run on a disk with nothing of any worth on it so that it can burp without trashing any useful files.

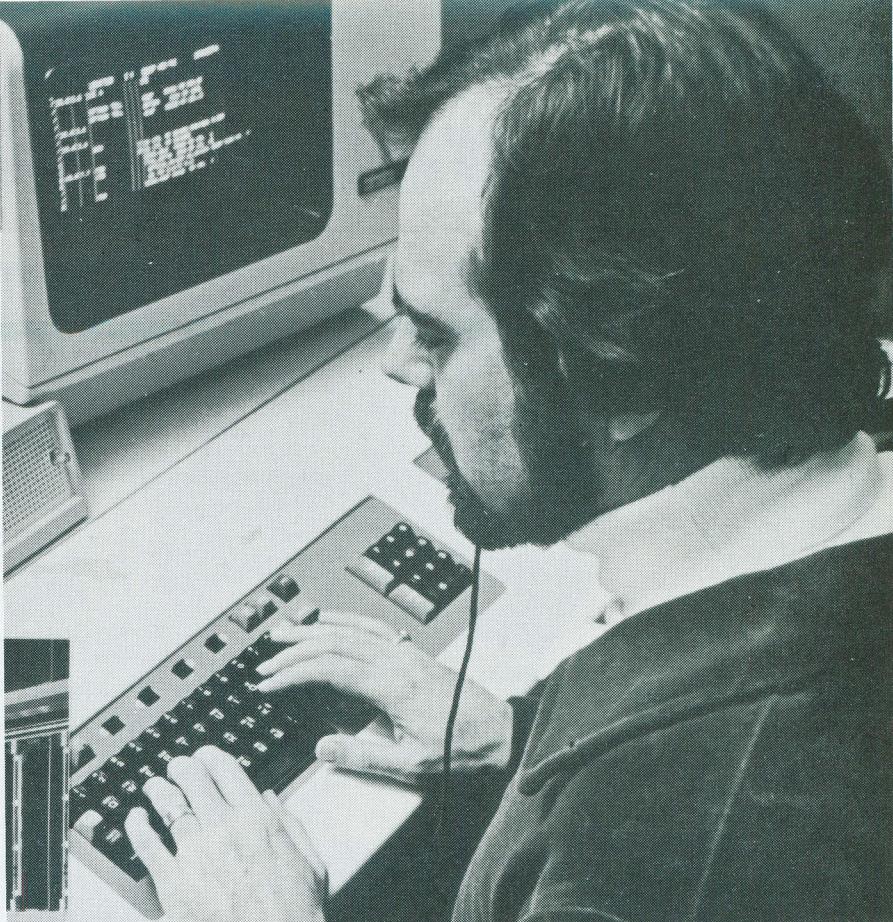
Buff and Shine

These are two fairly uninvolved applications of the console buffer code... you can mess with 'em and do quite a lot more. They both lend themselves to incorporation into larger things.

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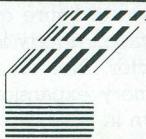
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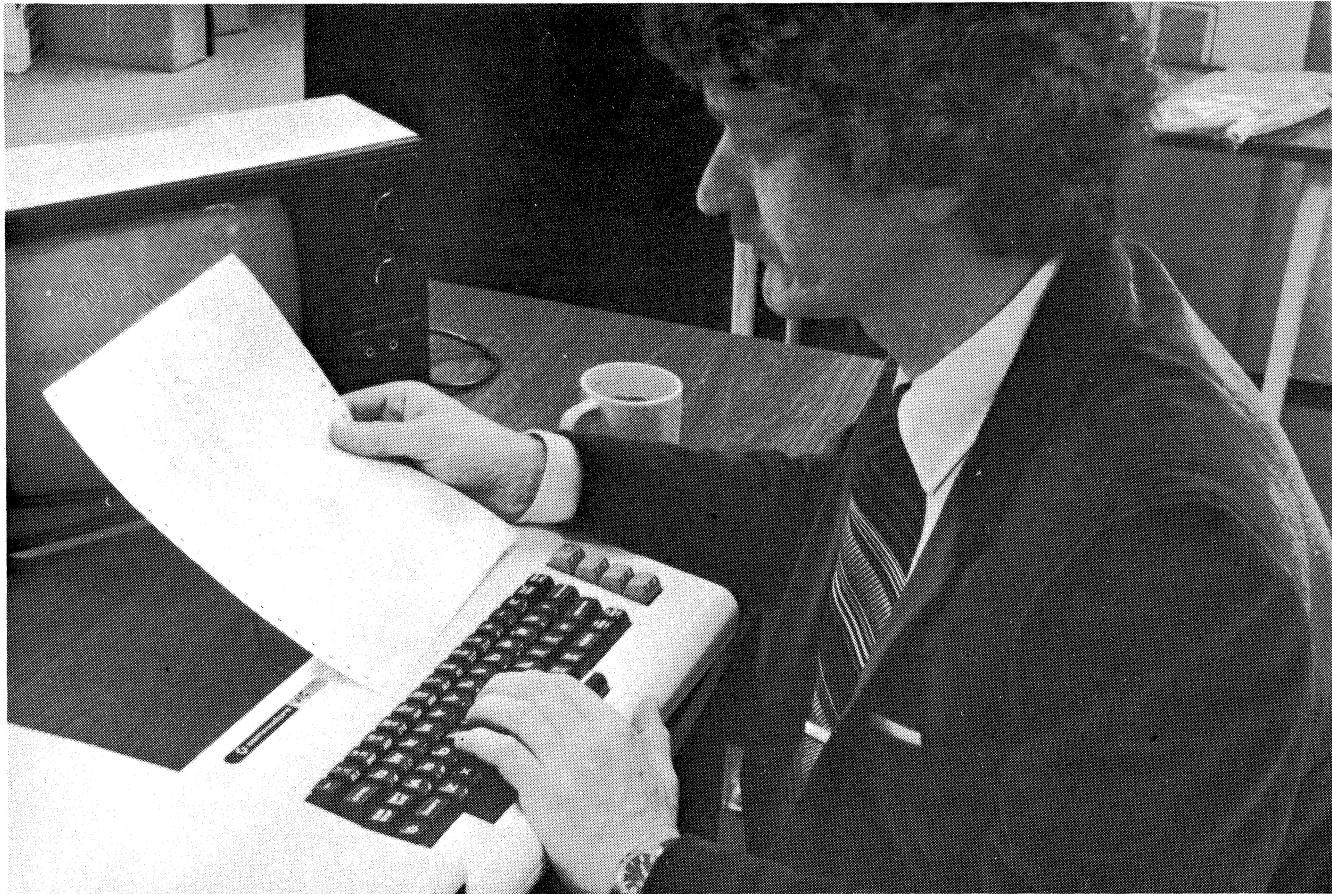
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RAM your VIC



If you have a VIC-20 you probably know the frustration of not having enough memory on board to do anything. Here's a cheap and effective way to RAM in some more.

by Brian Greiner

The VIC-20, although somewhat limited, is a pretty nifty little beast. It's most serious limitation is its standard five kilobytes of memory, of which less than four are available to the user to store BASIC programs. Fortunately, it is a simple matter to add up to twenty four kilobytes of RAM via the VIC's expansion port.

In fact, for most VIC owners, even a small handful of additional memory will be a vast improvement over the oft repeated OUT OF MEMORY error message. We shall now look at a quick and slippery card to plug an extra eight kilobytes into the system.

While not particularly tricky, this project will require the use of a soldering iron and other unholy devices.

On The Busses

The standard endowment of five kilobytes of RAM in the VIC is utilized as follows. The first K, locations zero through one thousand and twenty three... 0 to \$03FF in Martianspeak are used by the KERNAL operating system to store its parameters. Addresses 4096 to 8191, or \$1000 to \$1FFF are reserved for BASIC RAM. From this, the screen buffer takes five hundred and twelve bytes, leaving three thousand five hundred and eighty three bytes available to the user.

The KERNAL is the VIC's operating system. This is what takes care of making the VIC look intelligent.

There are two memory areas in the VIC where RAM can be added. To wit, you can stick it somewhere in the range of 1024 to 4095 (\$0400 - \$0FFF), in three one K blocks or you can heave it between 8192 and 16383 (\$2000 - \$3FFF) in up to three eight K blocks. There is a third area for extra memory, 40960 to 49152, but it is

reserved for ROM based programs.

When the VIC is turned on, the first thing it does is check the memory at 40960 for an auto start ROM sequence. If this sequence is found, the KERNAL transfers total control of the machine over to the program in the ROM. A useful feature, this, for games and such, but a positive drawback to putting BASIC RAM in this spot.

Another characteristic of the KERNAL is that it will change the memory allocation depending on where the extra RAM is added. Table one shows what gets shifted where. As can be seen, when RAM is added at the higher addresses, BASIC can no longer access any memory below \$1200. All things considered, it is as easy to add an eight K block of RAM as it is to add a three K one.

Expand

The memory expansion is done through the expansion port at the rear of the VIC. The signals available are shown in figure one. The connector itself is a standard forty four pin female edge connector. Not all the signals are used for memory expansion... the ones we use are shown in table two.

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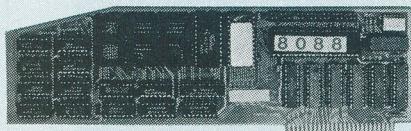
N.B. The implementation of RAM on board provides a very significant reduction in noise problems and glitches associated with 256K/RS232 plug-in RAM cards. Also there is less power consumption and wear and tear on power supply. Apple power supply can be used. Built-in diagnostics indicate i.e., memory, peripheral status. Memory banks are dipswitch selectable. Power-on reset. Up to 4 drives can be run. Single layer board — not multi-layer, thus the elimination of bus crosstalk. Manual includes assembly/test/operating instructions and schematic!

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RAM your VIC

The chip I've used in this project is the 6116 static RAM. It is cheap, easy to use, and widely available. This chip is organized as a block of 2048 one byte words, so that four are required for the eight K module.

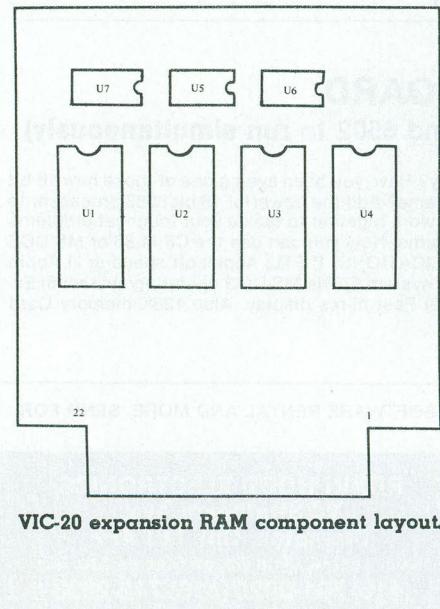
Construction is straightforward, and just about any construction technique will do. I used point to point wiring using Beldsol, a solderable insulated wire made by Belden. However, I used a somewhat heavier gauge of wire for the power lines, and for connecting the ICs to them.

There are a few things to watch for when building this module. The first is to be sure to get the connector pin numbers correct. The VIC numbering system is backwards from the usual approach, so that any pre-numbered perfboard, such as the Vector 3662-5 I've used here, will not match the expansion port numbers. Be sure to use lots of bypass capacitors between the positive five and ground lines around the ICs. These will soak up the noise spikes caused by IC switching logic levels. Values between 0.01 and 0.1 uF will do nicely. Use at least one bypass capacitor for each IC.

It's also a good idea to put a larger, electrolytic capacitor... ten microfarads is fine... across the positive five volt and ground lines near the the edge connector.

It's also important to tie any unused inputs of the logic gates (not the RAM chips!) to either plus five volts or ground. This prevents spurious noise from being generated within the chip and wreaking havoc.

The best way to test the completed board is by what we in the industry call "the smoke test"... plug it in and see if it works.



Be sure to plug it into the expansion socket with the power to the VIC off. Turn on the power, and the power up message should show that there are 11775 free bytes.

Bugs

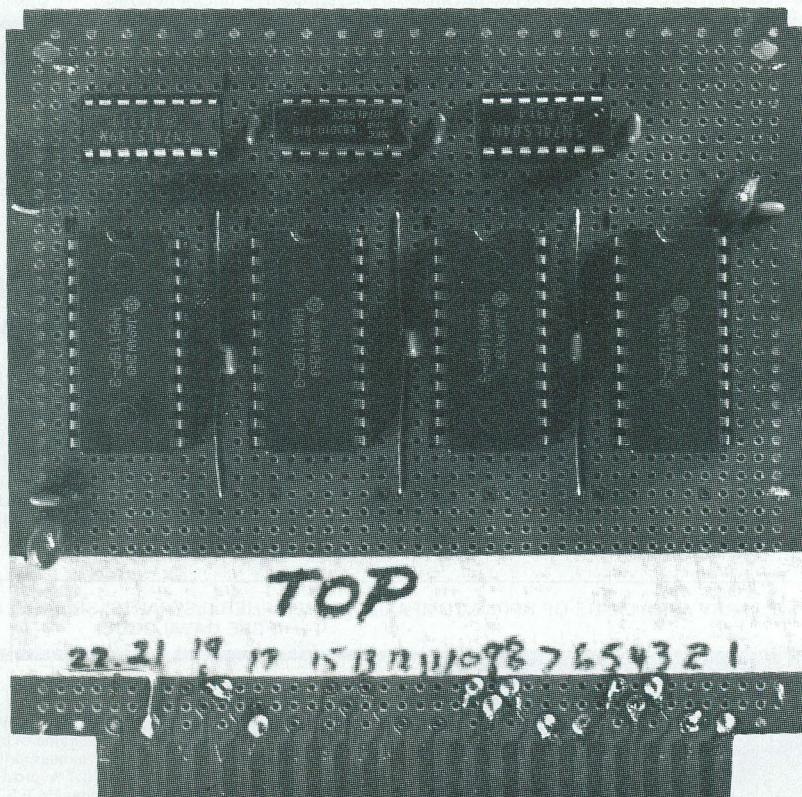
If the message shows only 3583 free bytes, the RAM chips are not being accessed at all. Check for wiring errors to the CE, OE, and WE lines of each chip. If the number of free bytes is higher than 3583 but lower than 11775, then one of the RAM chips is not working, for whatever reason. Problems are usually caused by broken wires, wiring errors, poor solder joints, and incorrect installation of the ICs.

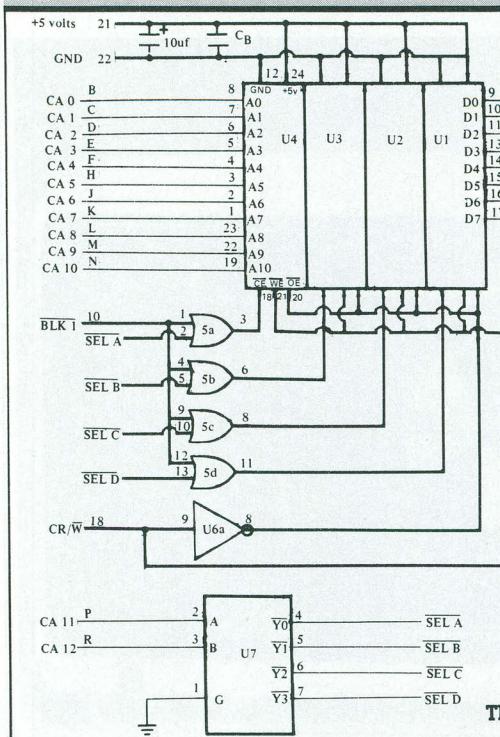
The last thing to suspect is a faulty chip, but if everything else looks OK, then try exchanging each chip with one known to be good, one at a time. The best way to prevent problems is to take your time when building the circuit in the first place. Doing the job right the first time will save a lot of headaches later on.

Adding an eight K expansion RAM to the VIC is not a difficult project, and should cost less than sixty dollars. This is not a project for the absolute beginner, but anyone with a little experience in constructing electronic circuits should not have any problems.

START OF ADDED RAM	START OF SCREEN BUFFER	START OF BASIC AREA
none	\$1E00	\$1000
\$0400	\$1E00	\$0400
\$2000	\$1000	\$1200

Table 2	
RAM 1	decodes 1K block 1024 - 2047 (\$0400 - \$07FF)
RAM 2	decodes 1K block 2048 - 3071 (\$0800 - \$0BFF)
RAM 3	decodes 1K block 3072 - 4095 (\$0C00 - \$0FFF)
BLK 1	decodes 8K block 8192 - 16383 (\$2000 - \$3FFF)
BLK 2	decodes 8K block 16384 - 24575 (\$4000 - \$5FFF)
BLK 3	decodes 8K block 24576 - 32767 (\$6000 - \$7FFF)
BLK 5	decodes 8K block 40960 - 49152 (\$A000 - \$BFFF)
CD0-7	data lines
CA0-13	address lines
CR/W	CPU read/write control line





The circuit of the memory expansion board.

Figure 1

VIC Expansion Bus Signals

Pin #	Function	Pin #	Function
1	GND	A	GND
2	CD0	B	CA0
3	CD1	C	CA1
4	CD2	D	CA2
5	CD3	E	CA3
6	CD4	F	CA4
7	CD5	H	CA5
8	CD6	J	CA6
9	CD7	K	CA7
10	BLK1	L	CA8
11	BLK2	M	CA9
12	BLK3	N	CA10
13	BLK5	P	CA11
14	RAM1	R	CA12
15	RAM2	S	CA13
16	RAM3	T	I/O2
17	VR/W	U	I/O3
18	CR/W	V	SO2
19	IRQ	W	NMI
20	NC	X	RESET
21	+5vdc	Y	NC
22	GND	Z	GND

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3-D? N
Overlay? Y
Manufacturer: Apple Computer
Price: \$98.00
Available from: Computer Innovations

VisiPlot

RAM needed: 48K
System(s): Apple II+, //e, IBM PC
Colour? Y
Compatible with: VisiCalc files
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? N
Overlay? Y
Manufacturer: Software Arts
Price: \$199.00
Available from: Softsource

Business Graphics System

RAM needed: 64K
System(s): IBM PC, CP/M micros
Colour? Y
Compatible with: VisiCalc files
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? Y
Overlay? Y
Manufacturer: Peachtree Software Inc.
Price: \$420.00
Available from: Citation Software (Distributors)

Lotus 1-2-3

RAM needed: 192K
System(s): IBM PC, other MS DOS systems
Colour? Y
Compatible with: VisiCalc files
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? N
Overlay? Y
Manufacturer: Lotus Development Corporation
Price: \$429.00
Available from: Computer Junction

Chart Master

RAM needed: 128K
System(s): IBM PC, other MS DOS computers
Colour? Y
Compatible with: VisiCalc files
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? N
Overlay? Y
Manufacturer: Decision Resources
Price: \$545.00
Available from: NSN Options

The Graphic Solution

RAM needed: 48K
System(s): Apple II+, //e
Colour? Y
Compatible with: N/A
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? Y
Overlay? Y
Manufacturer: Accent Software Inc.
Price: \$190.00
Available from: Micronic Computer Centre

PFS: Graph

RAM needed: 64K
System(s): Apple II+, //e, IBM PC
Colour? Y
Compatible with: VisiCalc files, PFS: Report/File
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? N
Overlay? Y
Manufacturer: Software Publishing Corporation
Price: \$119.95
Available from: Softsource

Addresses:

Computer Innovations, The Bay, Yonge and Bloor, Toronto, Ontario (416) 963-6003 • Citation Software, 1901 Logan Avenue, Winnipeg, Manitoba (204) 632-0559 • NSN Options, 11250 Wyecroft, Unit 11, Oakville, Ontario (416) 842-6530 • Micronic Computer Centre, First Canadian Place, Toronto, Ontario (416) 781-5229 • Software Centre, 931 6th Avenue SW, Calgary, Alberta (403) 269-6626 • Computer Junction, 878 Yonge Street, Toronto, Ontario (416) 960-0300 • Softsource, Box 18, 444 Robson Street, Vancouver, British Columbia V6B 2B5 1-800-663-9361 • Krepec Software Inc., 5460 Royalmount, Suite 208, Montreal, Quebec H4P 1H8 (514) 735-4749

LisaGraph

RAM needed: 1 Megabyte
System(s): Apple Lisa
Colour? N
Compatible with: LisaCalc, LisaDraw, LisaWrite
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? Y
Overlay? Y
Manufacturer: Apple Computer
Price: N/A
Available from: Apple dealers

Reportmaker

RAM needed: 64K
System(s): Apple CP/M, DEC Rainbow, Kaypro, Osborne, IBM PC
Colour? N
Compatible with: Wordstar
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? N
Overlay? Y
Manufacturer: Krepec Software Inc.
Price: \$160.00
Available from: Krepec Software Inc.

Context MBA

RAM needed: 256K
System(s): IBM PC and compatibles
Colour? N
Compatible with: N/A
Bar charts? Y
Pie? Y
Line? Y
X-Y? Y
3-D? N
Overlay? Y
Manufacturer: Context Management Systems
Price: \$899.00
Available from: Software Centre



Profile



Remember when teachers introduced students to new ideas and technology? Now it appears that the tables are turning.

by Keith Risler

Microcomputers are invading people's lives in a big way these days. They've made their way into offices and factories in the past and now they're turning up in schools with a promise to transform the way kids learn.

But on at least one front the forces of the computer revolution have run up against a big wall.

That wall is at the doors of our high schools.

Terry Cowx is in charge of the London Board of Education's Computer Assisted Learning Department. He says the problem with microcomputers in the high schools is that, for the first time, the school system was caught by surprise by the learning technology the micros represent.

"Previously, if you had an educational innovation it started from the top and it was pushed down," says Cowx.

"A perfect example of that would be educational television (ETV) in Ontario and the television network which was focussed primarily at an administration level.

"It sold to trustees first, who pushed it to administration, who pushed it on to principals. By the time it got to teachers it really wasn't what it was expected to be."

Cowx says that in contrast "the implemen-

tation of computers into the classroom has come from the home first via the students putting pressures on teachers, then teachers putting it on principals and going the exact opposite route."

The result is the opposite of what's happened in the past: instead of worrying about how to implement technology it already knows about, the board is faced with adapting itself to technology that's coming at it from the bottom up. That means nobody really knows for sure just how the proliferating micros should be used.

Young Upstarts

The problem of what to do with the upstart micros is being tackled by board committees and individual teachers in London's schools. Cowx says he has been so busy that he had no time to take a summer vacation.

Cowx and other teachers like Project Officer Jim Stewart at Montcalm Secondary School are working on two fronts to find a way to make effective use of the microcomputers. First, micros run on what's called software in computer jargon ... it's the set of special commands written in one of the many computer languages that makes a micro work in a specific way.

You need different software for each application, just like a writer needs new words and ideas each time he writes a book. Stewart

says there just isn't enough software available for educational use right now.

The second big problem is that the quality of present software isn't good enough to justify its use in most cases. When it is good enough to use, it usually is neither innovative in approach nor useful in promoting real creativity in the kids who are supposed to learn from it.

The need for specific programs is being filled in part by programmers who write specific applications programs.

"We've been successful in acquiring about one hundred and fifty thousand dollars worth of federal grant money to develop software," says Stewart.

"We have teachers who, on their own time, will describe for professional programmers exactly what they would like to see in a particular program. That description is passed on to the programmers who develop the software."

The summer programming spree has produced over one hundred programs for both elementary and secondary school use.

But mostly these programs are conventional uses for micros like drill and practice, and what's called Computer Assisted Instruction (CAI), a blanket phrase describing substitute teaching by the computer.

"We use the computers almost exclusively

in the high schools for delivering instruction, for teaching a computer language," says Stewart.

Without adequate software, it won't be possible for micros to get past the front doors of the high schools in big numbers.

Online Time

The time each student spends learning on a micro or using it creatively in his studies is minimal, amounting to just a few minutes a week at best. But there's at least one man in the London system who is trying to change all that.

Patrick O'Kelly is a learning resource teacher at Clarke Road Secondary School. He's studying the problem of teaching with microcomputers alongside people like Cowx and Stewart.

"I've become very interested in microcomputers in education," says O'Kelly.

"The calibre of the educational software as we know it today is largely unsatisfactory," according to the man who was also a co-ordinator of English for the board between 1978 and 1981.

The problem, O'Kelly says, is that software so far "has been developed by either technicians or computer programmers who are not in touch with kids and schools and curriculum and indeed how learning occurs."

Either that or software is written "by teachers who have still fairly limited skills as far as programming goes and therefore the programs themselves are somewhat naive and simple."

Many times computers are used by teachers as high tech electronic flash cards to drill and practice kids in the same way a teacher would.

"I refer to it as skill, drill and kill," says O'Kelly. "What in fact we see there is a direct steal from paper products. We go from paper text to video text and there's been no attempt to capitalize on the technology."

Solutions

Because O'Kelly does want to capitalize on the new technology he's doing research on the use of micros as a way to revolutionize the way kids write and think.

To that end O'Kelly thinks word processing software can be used to improve student writing. His work with the board will attempt to determine whether micros really can make their way into the classroom as writing tools across the curriculum.

A word processor of one kind or another can be purchased for most micros. It's just software that lets you type on a computer and manipulate in a radical and highly creative way what you've written. Many word processors allow you to store what's been typed on tapes or magnetic memory devices called

floppy disks. Word processors have special features that are not obvious to those who don't use them. Features include the ability to replace a specific word in a text with another ... all automatically with one command ... and the ability to rearrange sentences, paragraphs and pages at the push of a button.

O'Kelly thinks he may have found a way micros can be used with great success in the high schools when he found himself seated in front of a word processing computer a few years ago.

He was writing a story on the computer and found to his surprise he could type faster and more creatively than ever before. He found himself working so fast he began to think more quickly, to anticipate more precisely what was coming next just as a reader engages in creative prediction of what the next twist in a story will be.

"As a reader I was predicting what was going to happen and I was using those predictions to extend my story. I had a mutually extending kind of operation going on where my reading was going into my writing."

O'Kelly believes that word processing technology implemented on microcomputers will not only provide a way to accommodate the micros, but also force a reworking of the way English is taught in high school.

Although it's only speculation now, O'Kelly believes that when you sit students in front of a computer to write essays and other class work those students "will be applying reading strategies to their writing process."

The advantage is that writing can become more fluent and will be produced with a greater sense of self-worth on the students' part.

It will be that way, says O'Kelly, because the word processor frees students from traditional sources of frustration.

Learn By Doing

Since revisions and corrections with word processors are easy, even fun to make, kids won't have to worry about the form of what they're creating and will be free to take creative risks.

Most important, students can concentrate on the level of meaning rather than the level of surface structure or form.

"The writing will come more easily to them and will convince them that they're better writers. The knowledge that one is a better writer will tend to make one feel better about oneself and therefore self-concept as a writer will be reinforced."

O'Kelly is convinced that "You learn to write by writing and you're going to do a lot more of that if you feel good about it."

With the pain taken out of good writing, there's a chance the micro will open up a new horizon of creativity.

"Children will take more risks. We may see, as time goes by, different forms of writing, new genres developed as a result of this technology. I think we will see a tremendous renewal in poetics as a result of the formating and word-play that will come out of this technology," adds O'Kelly.



Profile

So English itself could be changed by the invading micros.

O'Kelly responds thoughtfully to the question of whether micros favor kids from better homes that can afford word processing computers.

Social and economic inequality has always been with us, says O'Kelly. He feels that with quickly falling prices and fast technological advances in system designs, the computer will become accessible to everyone.

With terminals in every home, having access to a computer will be no more complicated than paying the phone bill each month.

"Computers," O'Kelly concludes, "are marvelous for teaching rote learning ... and that's why so many of the software programs today are so dull and boring, because they are rote learning activities."

CN!



APDIAL

The Terminal Program for Apple CP/M Users

If you use an Apple compatible system under CP/M, you will probably have found that communications software for your computer is a bit scarce. At best, you can get very savagely stripped down versions of other CP/M terminals, which offer limited facilities.

There's a small purple dragon in your computer crying out for APDIAL.

APDIAL is a complete terminal package which can either stand alone or act as a front end for a protocol transfer system, like MODEM7. Among its features are:

- Written in machine code for blinding speed.
- Dials, waits for carrier and can autoloop if the line is busy.
- Automatically drops into terminal mode if it gets a carrier.
- Has an internal menu driven phone number library.
- Written for the Apple ... APDIAL is not hacked from other software.
- Can boot MODEM7 or another file transfer program automatically.

The APDIAL disk comes with both a COM file and an extensively commented source file which can be assembled with ASM or MAC. It comes configured for the low cost PDA 232C card, although users with even a rudimentary knowledge of assembler can change a few equates in the source and adapt it for any of the popular communications cards.

APDIAL costs \$19.95, which includes postage, packing and a brand new, high quality disk. Ontario residents please add 7%.

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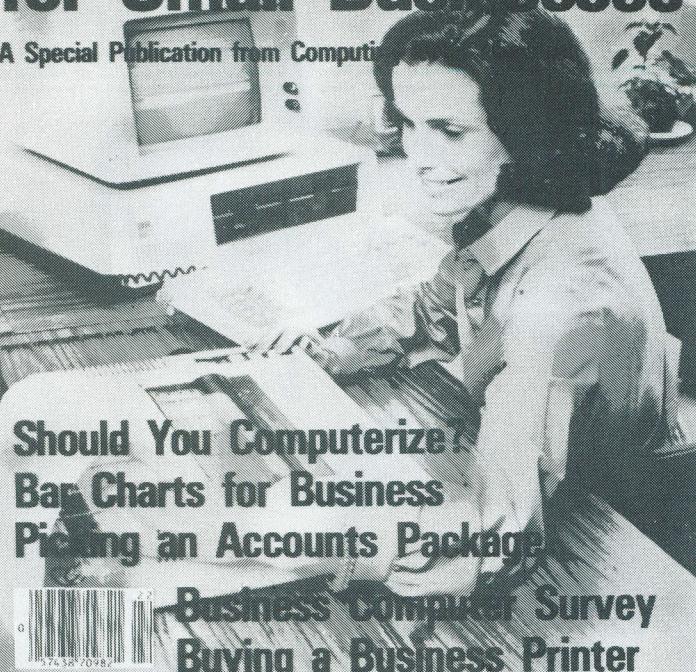
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The Morse Fruit



Morse code is one of those wonderful holdovers from the days of electro-mechanical everythings and vacuum tubes. However, still a viable medium of communication, it's a worthwhile thing to learn. Here's a program to help you get it together.

by Jim Dawson, VE2DYA

Perfectly sent CW is always a pleasure to listen to, but a bad fist can be close to the ultimate pain. Your Apple can give you practice sessions in correctly formed Morse code at any speed up to thirty five words per minute. Under the program presented here you have a choice of copying plain text or cipher groups of five characters each, and you can check your

copy against a printer or the screen..

The options available let you select those areas of Morse which give you the most trouble... letters, digits, punctuation and special characters, or a mixture of any or all of these.

The program is written in regular old Applesoft, so it can be applied to any fruit with a minimum of peripheral flotsam.

Key It In

In the practice mode, you can vary the pauses between the randomly generated character groups to suit your own needs. You may also alter the spacing between characters, or even the spacing between the character elements, and of course, you may alter the lengths of the character elements themselves.

Two buffers, each capable of holding up to two hundred and fifty four characters, give you virtually unlimited memory to store messages, and you may type into the buffers while you are copying an incoming CW signal. You can empty the buffers to your transmitter one at a time or sequentially, and you can easily modify the program

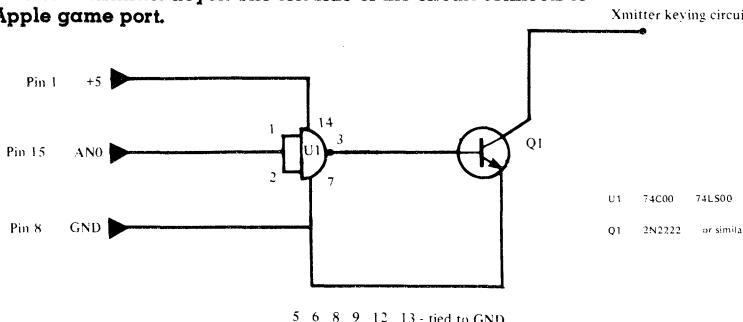
to store a permanent message in any of the buffers.

If you have owned your Apple for more than two days, you have probably found out that it is a bit of a mutt when it comes to making nice noises and you have no doubt kicked yourself for not buying a Commodore 64. Toggling the speaker by using X=PEEK(-16336) will, of course, give you a click, and clicks repeated fast enough will, it is true, give you something approximating a tone, but the song of a cricket in its death throes is vastly more appealing to most people.

The secret of getting your Apple to make nice noises quickly lies in using an assembly language program or in POKEing the right values into memory and CALLing the subroutine. Besides, the machine language you POKE in is vastly quicker than toggling the speaker, and speed is of the essence in Morse. Clicking the speaker is infinitely too slow for this kind of program.

Your Apple, marvelous little beast that it is, can no more read CW than it can read classical Greek. It can, though, be pro-

Figure 1. A transmitter keyer. The left side of the circuit connects to the Apple game port.



grammed to give symbolic meaning to a series of finite on and off states and to present on and off states of finite duration to the game plug.

If you POKE a 0 into location -16296, you will switch the Game Plug AN0 to about three and a half volts. Conversely, if you POKE zero into memory location -16295, the voltage at the Game Plug AN0 is virtually zero volts. While not, in theory, strictly necessary, the good people at Apple do recommend that you buffer the output voltage from the Game Plug AN0 pin if you intend to control part or all of the outside world from this pin.

Calling London

Enough talk of transmitters for the moment. Let's have a look at how this program works before getting into the nitty gritty of building the interface. The beginning student of Morse should be aware that the character A, for instance, is represented in Morse by dit dah, the dit is a carrier, or tone if you are using a speaker and not a transmitter, of very short duration, and the dah is a carrier or tone of longer duration, three times as long as that of the dit. The pause between the two elements of the CW character dit dah is equivalent in length to the dit itself.

Whether or not you followed all this doesn't matter too much at this point as long as you maintain approximately the apparent one to three ratio for dits and dahs in selecting your variables. It should be mentioned in passing that if you are beginning to study Morse code, you should use relatively high speeds for the character elements themselves, perhaps something closely akin to the default values in this program. You should insert slightly longer pauses between the characters, though and considerably longer pauses between words.

This said, there remains the problem of getting your Apple to speak CW. The problem is to convert a typed letter A in a buffer so it comes out of your speaker as dit dah or out of your antenna as a short burst

of radio frequency energy followed by a longer burst.

This program treats the problem in a way that is not too dissimilar from that used in most keyboard sending programs. An array is dimensioned containing all of the keyboard characters which we might wish to convert to Morse code characters. The dits and dahs of the Morse character are represented by ones and threes in the array.

Since this is a Morse training program as well as a sending program, I decided to opt for flexibility, and the keyboard character A is represented in the Morse array by the symbol 13. You will find it as the fifth character in Line 1410 in the Morse array. Not too surprisingly, perhaps, B is the next Morse character represented symbolically as 3111 and so on to Z which is 3311, dah dah dit dit.

The user is free to adjust the variables to suit himself. DIL is the dit length, DAL is dah length and the space between the dits and dahs is labelled ES (element space). Similarly CS is the space between characters, WS the space between words, and PG the pause between groups of characters sent in the practice portion of the program.

The parameters for the generation of correctly formed CW characters are established initially in line 100. Any or all of them can, of course, be changed at will to allow for different CW speeds. The table at

the end of this article will help you in setting up the desired default values for line 100. A speed of about fifteen words per minute was chosen for the initial default values.

A rather long value is recommended for the variable PG, the pause between groups of characters sent in the practice portion of the program. This leads to an effective CW speed which is much lower than fifteen words per minute for practice. As you progress with your ability to copy accurately, you will want to shorten the variables. PG should be the first one to shorten. Try a default value of a thousand in line 100 to start with. It can gradually come down to something in the neighbourhood of a hundred as your copying improves. CS can be shortened next to something roughly the equivalent of two DAL values, and ES can be shortened to the equivalent of a dit in length.

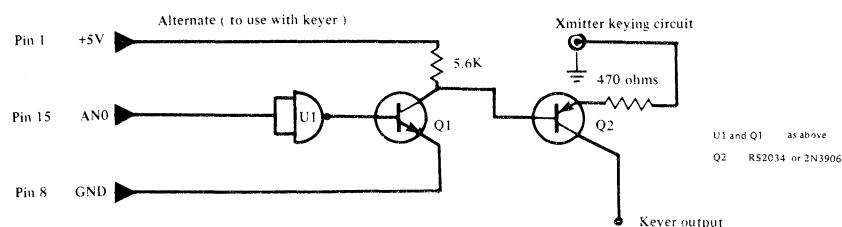
Once you have reached the suggested values, you should be ready to start cutting down gradually on DIL and DAL themselves! At their smallest values, eight for DIL and twenty four for DAL, the effective CW speed is about thirty words per minute.

Choices

The first option in this program is the choice of sending the output to the screen or to the printer. If you are learning Morse, I strongly suggest you use the printer option. This avoids a tendency to glance at the screen while you are copying. I suggest, too, that the variable PG be set to about a thousand if you are just starting to learn Morse. DAL could also be lengthened slightly. The remaining options are self explanatory.

Option seven is intended as an on the air option though it can be used in practice if you have an instructor to send to you.

If you have opted to use the printer rather than the screen at the outset of the program, don't think things aren't working just because the program sits by idly while characters are being sent. It will wait until it



Ref: Radio Amateurs' Handbook, 1977

Figure 2. Another transmitter keyer.

The Morse Fruit

```

100 HOME :DIL = 18:DAL = 50:WS =
240:CS = 120:ES = 15:ST = 85
:PG = 300: POKE - 16296,0
105 HOME : INVERSE : PRINT "MORSE CODE PRACTICE AND SENDING
PROGRAM": NORMAL
110 VTAB 12: PRINT "DO YOU WISH
THE OUTPUT TO GO TO THE DMP
OR THE SCREEN? TYPE 'P' FOR
PRINTER, 'S' FOR SCREEN.
";: GET P$: HOME
260 VTAB 4: HTAB 4: INVERSE : PRINT
" MORSE CODE SENDING/PRACTICE
PROGRAM": PRINT :
270 NORMAL
280 HTAB 17: FLASH : PRINT "OPTI
ONS": NORMAL : PRINT
290 PRINT : HTAB 7: PRINT "CODE
PRACTICE": PRINT
300 FOR I = 1 TO 7: READ D$(I): NEXT
I
310 DATA 1 RANDOM LETTERS, 2
RANDOM NUMBERS, 3 RND. PUNC
T. & SP. CHARS., 4 RANDOM 1
& 2, 5 RANDOM ALL ABOVE MIX
ED, 6 CHANGE CW PARAMETERS,
7 CW SENDING PROGRAM
320 FOR I = 1 TO 7: HTAB 10: PRINT
D$(I): PRINT : NEXT I
330 PRINT : INVERSE : PRINT "TYP
E NUMBER OF YOUR CHOICE TO S
ELECT":; GET N: NORMAL
340 IF N > 7 OR N < 1 THEN GOTO
360
350 HOME : GOSUB 1370
370 ON N GOTO 560,580,595,625,65
5,685,690
500 HTAB 12: INVERSE : PRINT "IN
STRUCTIONS": NORMAL : PRINT
: PRINT
505 PRINT "1 USING QUOTATION
MARKS AROUND YOUR INPUT, TY
PE IN YOUR FIRST STRING UP T
O": PRINT "254 CHARACTERS IN
LENGTH. TYPE A '%' : PRINT
"SIGN IF YOU WISH TO FILL BU
FFER TWO."
510 PRINT
520 PRINT "2 PRESS 'RETURN'
TO SEND YOUR ": PRINT "STRIN
G TO THE TRANSMITTER AND TO
YOUR": PRINT "APPLE SPEAKER.
";: INVERSE : PRINT "BUFFER
OUTPUT TO XMITTER, PLEASE!":
NORMAL : PRINT
530 PRINT "OUTPUT AVAILABLE AT P
IN 15 OF GAME": PRINT "PLUG
, THE 'AN0' PIN. +5 VOLTS M
AY BE": PRINT "FOUND AT PIN
1, AND PIN 8 IS GROUND."
540 PRINT "PRESS ANY KEY TO GO O
N.": GET AK$
550 HOME : POKE - 16296,0: GOTO
690
560 GOSUB 1250: IF P$ = "P" THEN
PR# 1: PRINT CHR$ (9); "40N
";
564 FOR I = 1 TO 5:K = INT (26 *
RND (1) + 65)
565 GOSUB 1500
570 NEXT I
575 GOTO 560
580 GOSUB 1250: IF P$ = "P" THEN
PR# 1: PRINT CHR$ (9); "40N

```

```

"; 584 FOR I = 1 TO 5:K = INT (10 *
RND (1) + 48)
585 GOSUB 1500: NEXT I
590 GOTO 580
595 GOSUB 1250: IF P$ = "P" THEN
PR# 1: PRINT CHR$ (9); "40N
";
596 FOR I = 1 TO 5:K = INT (19 *
RND (1) + 28)
600 IF K = 28 THEN SC$ = "HI": GOSUB
2000: GOTO 615
601 IF K = 29 THEN SC$ = "AS": GOSUB
2000: GOTO 615
602 IF K = 30 THEN SC$ = "SK": GOSUB
2000: GOTO 615
603 IF K = 31 THEN SC$ = "73": GOSUB
2000: GOTO 615
604 IF K = 32 THEN SC$ = "AR": GOSUB
2000: GOTO 615
605 IF K = 34 OR K = 35 OR K = 3
6 OR K = 39 OR K = 42 OR K =
43 THEN I = I - 1: GOTO 615
606 IF K = 37 THEN I = I - 1: GOTO
615
610 GOSUB 1500
615 NEXT I
620 GOTO 595
625 GOSUB 1250: IF P$ = "P" THEN
PR# 1: PRINT CHR$ (9); "40N
";
626 FOR I = 1 TO 5:K = INT (42 *
RND (1) + 48)
630 IF K = 58 OR K = 59 OR K = 6
0 OR K = 61 OR K = 62 OR K =
63 OR K = 64 THEN I = I - 1:
GOTO 640
635 GOSUB 1500
640 NEXT I
645 GOTO 625
655 GOSUB 1250: IF P$ = "P" THEN
PR# 1: PRINT CHR$ (9); "40N
";
656 FOR I = 1 TO 5:K = INT (58 *
RND (1) + 28)
660 IF K = 28 THEN SC$ = "HI": GOSUB
2000: GOTO 675
661 IF K = 29 THEN SC$ = "AS": GOSUB
2000: GOTO 675
662 IF K = 30 THEN SC$ = "SK": GOSUB
2000: GOTO 675
663 IF K = 31 THEN SC$ = "73": GOSUB
2000: GOTO 675
664 IF K = 32 THEN SC$ = "AR": GOSUB
1070 L = LEN A$(2)
1080 FOR KK = 1 TO L
1090 R$ = MID$ (A$(2),KK,1)
1100 IF R$ = "1" THEN GOSUB 115
0
1110 IF R$ = "3" THEN GOSUB 120
0
1120 NEXT KK
1130 FOR PAUSE = 1 TO CS: NEXT P
AUSE
1140 RETURN
1150 POKE - 16295,0
1160 POKE 16000,ST: POKE 16001,D
IL: CALL 16002
1170 FOR WW = 1 TO ES: NEXT WW
1180 POKE - 16296,0
1190 RETURN
1200 POKE - 16295,0
1210 POKE 16000,ST: POKE 16001,D
AL: CALL 16002
1220 FOR LL = 1 TO ES: NEXT LL
1230 POKE - 16296,0
1240 RETURN
1250 POKE 16002,173: POKE 16003,
89: POKE 16004,192
1260 POKE 16005,173: POKE 16006,
48: POKE 16007,192
1270 POKE 16008,136: POKE 16009,
208: POKE 16010,5
1275 POKE 16011,206: POKE 16012,
129: POKE 16013,62
1280 POKE 16014,240: POKE 16015,
9: POKE 16016,202
1290 POKE 16017,208: POKE 16018,
245: POKE 16019,174
1300 POKE 16020,128: POKE 16021,
62: POKE 16022,76
1310 POKE 16023,133: POKE 16024,
62: POKE 16025,173
1320 POKE 16026,88: POKE 16027,1
92: POKE 16028,96
1330 FOR II = 1 TO CS: NEXT II
1340 RETURN
1370 DIM A$(59): FOR I = 1 TO 59
: READ A$(I)
1380 NEXT I
1390 DATA "1111", "1111", "1111",
"0TE", "#", "$", "%", "1
111", "", "33113313", "3311331
3", "*", "+", "331133", "31113",
"131313", "31131", "33333", "13
333", "11333"
1400 DATA "11133", "11113", "111
11", "31111", "33111", "33311",
"3331", "333111", "313131", "1
1111111"
1410 DATA "13111", "113311",
"111313", "13", "3111", "3131"
", "311", "1", "1131"
1420 DATA "331", "1111", "11", "13
33", "313", "1311", "33", "31",
"333", "1331", "3313", "131"
1430 DATA "111", "3", "113", "1
113", "133", "3113", "3133",
"3311"
1440 RETURN
2000: GOTO 675
665 IF K = 37 THEN I = I - 1: GOTO
675
666 IF K = 34 OR K = 35 OR K = 3
6 OR K = 37 OR K = 39 OR K =
42 OR K = 43 THEN I = I - 1:
GOTO 675
670 GOSUB 1500
675 NEXT I: GOTO 655
680 GOTO 300
685 HOME : VTAB 8: PRINT "LIST L
INE 100 AND MAKE DESIRED CHA
NGES - SEE TABLE. RE-RUN PRO
GRAM.": END
686 HOME : GOTO 320
690 GOSUB 1250
700 HOME : PRINT : PRINT : PRINT
"TYPE FIRST BUFFER CONTENTS
NOW UP TO": PRINT "254 CHARA
CTERS. USE '%' SIGN AT END
": PRINT "YOUR STRING AND US
E QUOTATION MARKS AROUND ENT
IRE STRING.": PRINT : PRINT
710 PRINT : PRINT
720 INPUT FA$: PRINT : PRINT : PRINT
730 Q = LEN (FA$)

```

```

740 PRINT "Q="; Q: PRINT
750 K = 1
755 IF P$ = "P" THEN PR# 1: PRINT
    CHR$(9); "80N";
760 PRINT MID$(FA$, K, 1);
770 M$ = MID$(FA$, K, 1)
780 GOSUB 1010
790 K = K + 1
795 IF K = Q + 1 THEN GOTO 940
800 GOTO 760
920 HOME : PRINT : PRINT
925 PR# 0
930 K = 1
940 PR# 0: INVERSE : PRINT "PRES
S 'N' TO REFILL THE BUFFER."
: PRINT : PRINT "PRESS SPACE
BAR TO GO TO TERMINATOR."
950 PRINT : PRINT "TERMINATOR-->
'SO BACK TO U OM. HW CPI?'"
955 NORMAL : PRINT : PRINT
960 FF$ = "SO BK TO U OM - HW CPI
?"
965 K = 1
970 GET Q$: IF Q$ = "N" THEN 690

975 PRINT : PRINT FF$
980 M$ = MID$(FF$, K, 1)
985 IF K = Z THEN GOTO 690
990 K = K + 1: PRINT M$;: GOSUB 1
010: GOTO 980
1010 IF M$ = "" THEN 1140
1011 IF M$ = " " THEN 1050
1012 P = ASC(M$)
1020 IF M$ = "%" THEN 700
1030 GOTO 1060
1050 FOR CC = 1 TO WS: NEXT CC: GOTO
1140
1060 Z = P - 31
1450 FOR P = 1 TO PG: NEXT P: RETURN

1500 M$ = CHR$(K): PRINT M$;: QQ
    = QQ + 1
1502 GOSUB 1010
1505 IF QQ = 5 THEN PRINT ":
    ;:QQ = 0: FOR P = 1 TO PG:
    NEXT P
1510 RETURN
2000 PRINT SC$;: FOR XX = 1 TO 2
    :M$ = MID$(SC$, XX, 1)
2005 QQ = QQ + 1
2010 ES = 15: CS = 0: GOSUB 1010
2020 NEXT XX: IF QQ > = 5 THEN
    PRINT ":
    ;:QQ = 0: FOR
    P = 1 TO PG: NEXT P
2030 RETURN

```

has a complete line to type before springing to life.

In operation, the CW characters have been stored in symbolic form in the array starting at line 1390. As a given character is called for, its components of ones and threes are examined one at a time in lines 1100 and 1110 and the appropriate dit or dah sending subroutine in lines 1150 and 1200 is activated. The machine language subroutine is identical for both dits and dahs; it has been POKEd into memory at location 16002. It is CALLED by the dit or dah subroutine and sent for the length of time determined by the variables DIL and DAL.

The next part of the program is rather more complex. Line 564 generates random letters, line 584 generates digits and line 596 creates punctuation marks and special characters used in communications such as 73, SK, AR, and HI. Mixtures of letters and digits, letters with punctuation and special characters are created in lines 626 and 656. The bar over these special characters signifies that they are sent with no space between parts. AR, for instance, is sent as didahdidahdit, not didah didahdit!

The special CW characters such as AR, AK, SK and 73 are sent with no space between the characters. I allowed for this in the randomly generated special characters used in the practice portion of the program but, for the sake of simplicity, I did not include all of these special characters in the transmitting portion of the program. You may send the special group ES by using the ampersand sign, &, in your text, and the error sign consisting of eight dits in a row is sent by pressing the less than symbol. To include the other special symbols, replace % in the array in line 1390 with, for instance, 13131, and you will generate AR by including % in your test buffer in its place.

Three other free symbols which you

may wish to use are +, *, and \$. For example, substituting 111313 for the \$ sign in the array will effectively send SK when your message is transmitted.

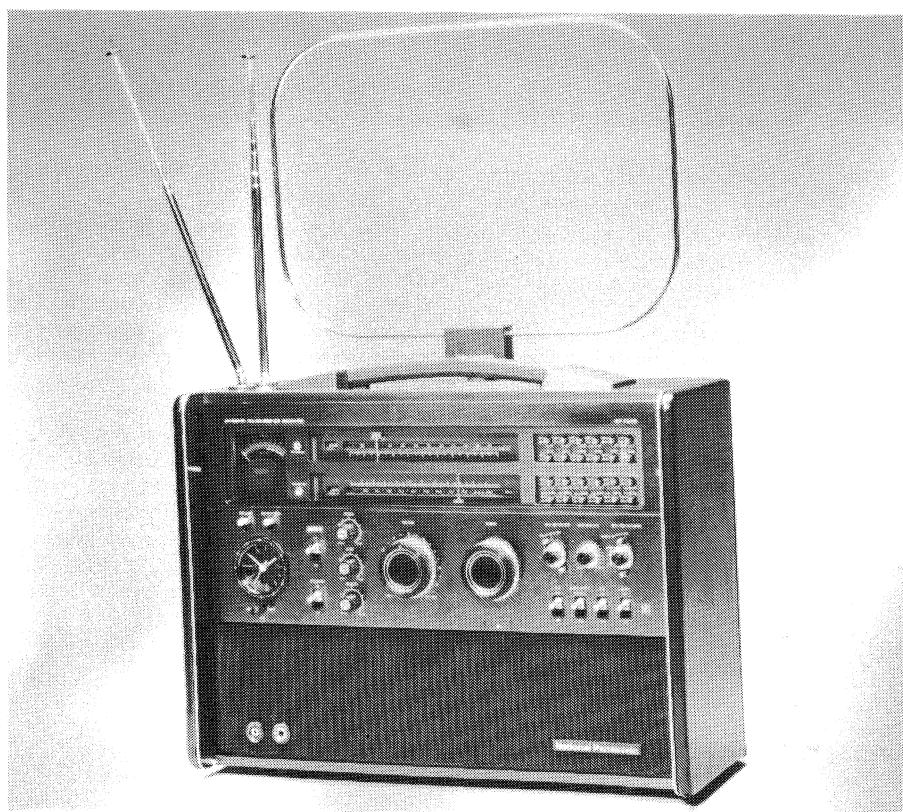
Fruit Power

When you turn your Apple on, there is no way of being certain of the state of the AN0, so in Line 100 the value is initialized to 3.4 volts with the POKEing of a 0 into location 16296. When later you send a dit or a dah element to your transmitter, lines 1150 (for dits) and 1200 (for dahs) turn the game annunciator on and lines 1180 and 1230 turn it off at the completion of the dit and dah sending subroutines.

Table 1
SPEED DIL DAL ES CS WS PG

5 WPM	38	114	38	342	650	650
10 WPM	25	75	25	225	450	450
15 WPM	18	50	15	120	250	270*
20 WPM	13	45	10	85	120	120
25 WPM	10	30	7	60	85	100
30 WPM	8	24	4	43	70	70
35 WPM	7	19	0	30	50	60

* Change to at least four hundred for practice with random groups of characters.



CNI

Passing Parameters In Microsoft BASIC

Microsoft BASIC is a great language but one thing that it lacks, as do most BASICs, is the ability to pass parameters to its subroutines.



by Perry Ruiter

One of the ideas behind a subroutine is that when a programmer has to continually repeat a process at various points throughout a program, he puts this process into a subroutine and calls it when necessary. This works fine in BASIC as long as the process is always repeated using the same variables; however, the programmer may want to repeat a similar process on different variables. Enter the parameter.

A look at Listing 1 will give you a general idea of how the parameter is used in other high level languages (Pascal for example). Basically what happens when a parameter is passed is that the value of the first variable in the call statement is given to the first variable in the subroutine parameter list, and so on with the second, third . . . In the run of Listing 1, first the number ten is written out, then twenty, even though both times the statement in the subroutine said write y. As you can see, this lets the programmer write a general purpose routine that works on more than just a specific set of variables. An example of parameter usage that you may already be familiar with, is the

function facility that is available in many versions of Microsoft BASIC.

The only way that I could think of emulating subroutine parameters in BASIC was to either swap values into and out of shared variables, or write a separate routine for each different variable, which defeats the purpose of subroutines. If your problem is, as mine was, to sort arrays, then swapping values into and out of over one hundred and fifty locations four or more times, becomes unacceptable due to the slowing of execution speed. To duplicate a sort routine four times, changing only the variable, was to me, not only a waste of good memory, but also stupid. I became convinced that there had to be a better way even if it meant going to assembler.

Variables and VARPTR

As it turned out, I didn't have to resort to machine language, and to pass parameters requires only the addition of one line before and after your GOSUB. Before we delve into how it's done, we'll take a look at how Microsoft BASIC stores its variables.

BASIC sets up a chain of variables,

rather than a symbol table. When your program begins executing this chain is initially empty. As your program executes and runs into variables being accessed (defined, initialized, and so on), it searches through this chain looking for the required variable. If the interpreter gets to the end of the chain without finding the variable, it defines it and initializes it to zero. Anyway, the point here is that the name of the variable is stored with the variable's contents.

Quite simply then, to pass parameters, change the name of the variable rather than the contents. To do this, you only need to know where the variable is stored in memory, and this is revealed by the VARPTR function. VARPTR requires one argument, the name of the variable whose address you wish to find and it returns an address related to that variable. All you have to do is find the name relative to this address. At this point, I must make a distinction between the various versions of Microsoft BASIC floating around out there. I have come across three different forms of storing variables, but there may be others. I'll give you a program that will let you determine

Listing 1

```
program EG (input,output);
var i,j : integer;

procedure print (y : integer);
begin
  writeln (y)           { print parameter }
end;

begin
  i := 10;              { pass value of 10 }
  print (i);
  j := 20;              { pass value of 20 }
  print (j)
end.

- OUTPUT -
10
20
```

Listing 2

```
10 ' SET K TO:
11 '   1 for type 1 machine
12 '   2 for type 2 machine
13 '   3 for type 3 machine
20 K=3      ' change for your machine
30 I=10
40 J=20
50 POKE VARPTR(I)-K,ASC("Y")  ' Rename I to Y
60 GOSUB 200
70 POKE VARPTR(Y)-K,ASC("I")  ' Rename Y back to I
80 POKE VARPTR(J)-K,ASC("Y")  ' Rename J to Y
90 GOSUB 200
100 POKE VARPTR(Y)-K,ASC("J") ' Rename Y back to J
110 END
200 ' ROUTINE TO PRINT Y
210 PRINT Y
220 RETURN ' PRINT

- OUTPUT -
10
20
```

Listing 3

```
10 ' See what type of machine I have
20 A=2
30 FOR I=0 to 4
40 PRINT PEEK(VARPTR(A)-I)
50 NEXT
60 END

- SAMPLE OUTPUT -
```

type 3	type 2	type 1
0	0	0
0	0	65
0	65	0
65	4	4
4	?	?

N.B. The question mark indicates that we cannot be sure of the contents of this memory location. It could contain any value.

Listing 4

```
5 ' WRONG
10 ' SET K TO:
11 '   1 for type 1 machine
12 '   2 for type 2 machine
13 '   3 for type 3 machine
20 K=3      ' change for your machine
30 A=10
40 B=20
50 GOSUB 200
60 POKE VARPTR(B)-K,ASC("A")  ' Rename B to A
70 GOSUB 200
80 POKE VARPTR(A)-K,ASC("B")  ' Change A back to B
90 END
200 ' ROUTINE TO PRINT A
210 PRINT A
220 RETURN ' PRINT

- OUTPUT -
10
10
```

your machine's type at the end of this article.

The three methods of storing aren't all that different. The first two are for machines that only allow variable names to be two characters in length, such as the Radio Shack machines. The first type stores the variable name AB in memory as BA. The Model One does this. The second type would store the variable name AB in memory as AB. The Colour Computer stores variables this way. The third type is for machines that allow variables to be as long as you like up to forty characters. This machine stores the variable name AB in memory as AB, but at a different distance from VARPTR than the others. The Heath H89 or IBM are examples of the last type. From now on I'll refer to these as type one, type two, and type three machines respectively. Figure 1 shows how a number, string and array are stored on each machine. Listing 2 is a BASIC version of Listing 1. Type it in and try it.

To determine your machine's type run the program in Listing 3. This will display memory around variable A. The first byte displayed is the first byte of variable A. We are then going backwards in memory looking for the variable name.

Look for the value 65. This is decimal for A as ASCII represents it. Now count back the number of bytes until you get to the 65. If you have to count back one byte it's a type one, two bytes a type two, and three bytes a type three.

Here's How

For type one and two machines, to change the name of a single precision, double precision, string or integer variable, POKE the ASCII value for the letter(s) of the new name into locations (VARPTR-1) and (VARPTR-2). If neither the old or new name has a second letter, don't bother POKEing that value. However, the unused portions of names contain the ASCII NUL character (decimal zero). To change the variable name back, just POKE the old value(s) upon returning from the GOSUB statement. To change the name of an array on a type one or type two machine, POKE the value of the name into locations (VARPTR-(4+2N)) and (VARPTR-(5+2N)), where N is the number of dimensions in an N-dimensional array, and VARPTR is called with the zero-most element . . . for example, A(0,0) or A(0,0,0) here N=2 and N=3 respectively.

In order to change variable names on the type three machine, a little more must be said on how the machine stores its variable names if the name is longer than two characters. The name is stored as the first

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Passing Parameters In Microsoft BASIC

Listing 5

```

5   ' RIGHT
10  ' SET K TO:
11   ' 1 for type 1 machine
12   ' 2 for type 2 machine
13   ' 3 for type 3 machine
20 K=3   ' change for your machine
30 A=10
40 B=20
50 GOSUB 200
60 POKE VARPTR(B)-K,ASC("A")  ' Rename B to A
70 POKE VARPTR(A)-K,ASC("B")  ' Change A back to B
80 GOSUB 200
90 POKE VARPTR(A)-K,ASC("B")  ' Change A back to B
100 POKE VARPTR(B)-K,ASC("A")  ' Rename B to A
110 END
200 ' ROUTINE TO PRINT A
210 PRINT A
220 RETURN ' PRINT
      - OUTPUT -
10
20

```

two characters of the name, then a single byte is used as a counter indicating the number of additional characters in the name. These additional characters are stored with an offset of one hundred and twenty-eight added to them. For example, the name SWILL would be stored in memory as: 83 87 3 201 204 204; 83 and 87 are SW, 3 is the number of additional characters in the name, and 201, 204 and 204 are ILL with an offset of one hundred and twenty-eight added. The variable name K9 would be stored as: 75 57 0. It's a lot of work changing a variable name that is very large, and most people probably won't do it, hence the examples are also kept simple. Knowing now what we do about variable storage, we can come up with a formula that will let us easily change a variable name on a type three machine.

For undimensioned variables, the first letter of the name is stored at location (VARPTR-(3 + # of additional characters)). Additional characters have the same meaning here as in the previous paragraph. The second letter of the name is at location (VARPTR-(3 + # additional characters -1)). The third through N characters, where N is the number of characters in the name, are at location(s) (VARPTR-(3 + # additional characters -i)) where i = 3 for the third, 4 for the fourth . . . N for the nth. Don't forget the value of the third to Nth characters have one hundred and twenty-eight added to them.

To change the name of an array on a type three machine, do the following. The first letter is at location (VARPTR-(6 + 2N + # additional characters)). The second letter is at location (VARPTR-(6 + 2N + # additional characters -i)); where i = 3 for third, 4 for fourth . . . N for the nth. Here again N is the number of dimensions in an N dimensional array and VARPTR is called with the zero-most element. For example, we have been given a subroutine that performs some as yet undefined function on array A. In our main

program we have defined two arrays, X and Y, which we wish to pass to the subroutine. This is done by renaming array X to A, calling the subroutine, and upon returning, renaming array A to its original name, X. We simply repeat the process if we wish the subroutine to operate on Y, replacing Y for X in the above example.

A Word of Warning

Write your subroutine(s) using "dummy" variables for the parameters, variables that are not defined *anywhere* else in your program. You may feel that if A in the above example is not defined, that operations cannot be performed on it when the subroutine is called. What actually happens though, is that when BASIC scans the variable chain for the array A, it finds what appears to be an array named A that is defined. This is in fact the array X that we "renamed" A.

If you choose however, to use previously defined variables as your subroutine parameters, be careful: you are treading on thin ice. Suppose you wrote a subroutine

that operates on a variable A and later you discover you would also like to perform the same operation on variable B. You would think that simply renaming B to A and calling the subroutine would suffice. This isn't always the case . . . see Listing 4. You run into problems if A is ahead of B in the variable chain. To start with, the chain looks like:

Head . . . A . . . B . . .

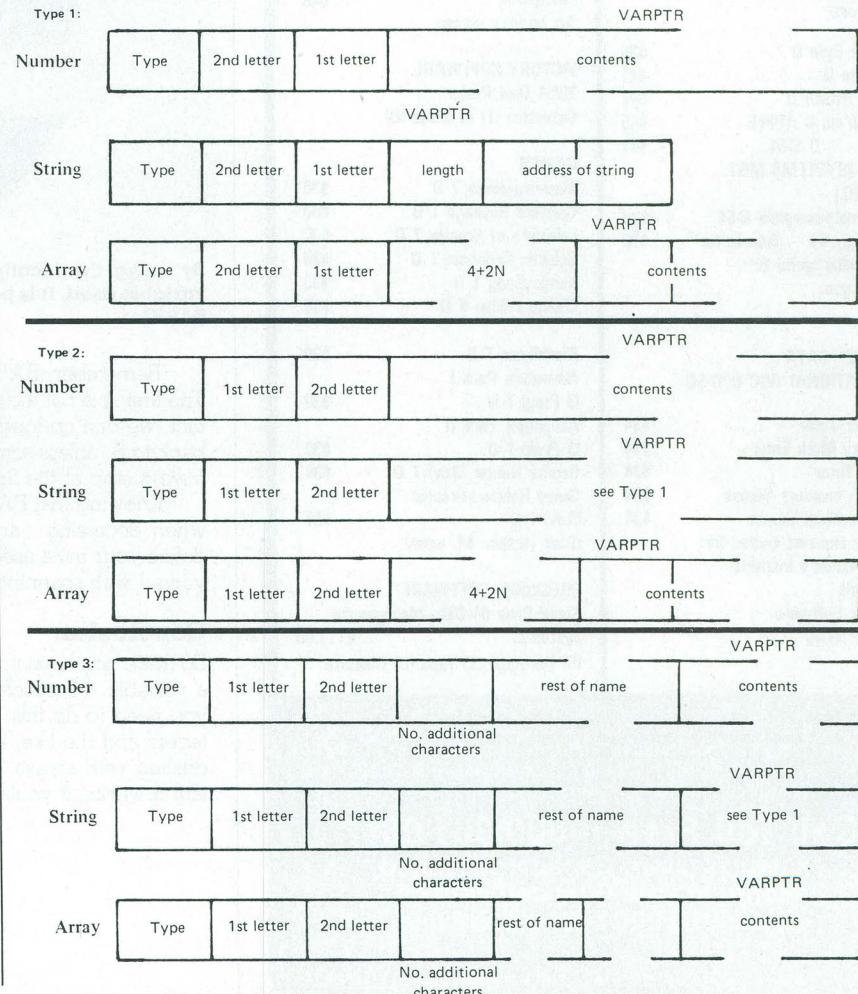
We rename B to A in preparation for the subroutine call. The chain now looks like:

Head . . . A . . . A . . .

We then call the subroutine that operates on A. It scans the variable chain and finds an A, the original A, performs its operation(s) on this A and returns. Then upon returning we rename A back to B and the chain looks like:

Head . . . B . . . A . . .

which is not what we want at all. If you must do this, Listing 5 shows how to do it properly. However, it would be better and easier to write the routine to use say, ZZ.



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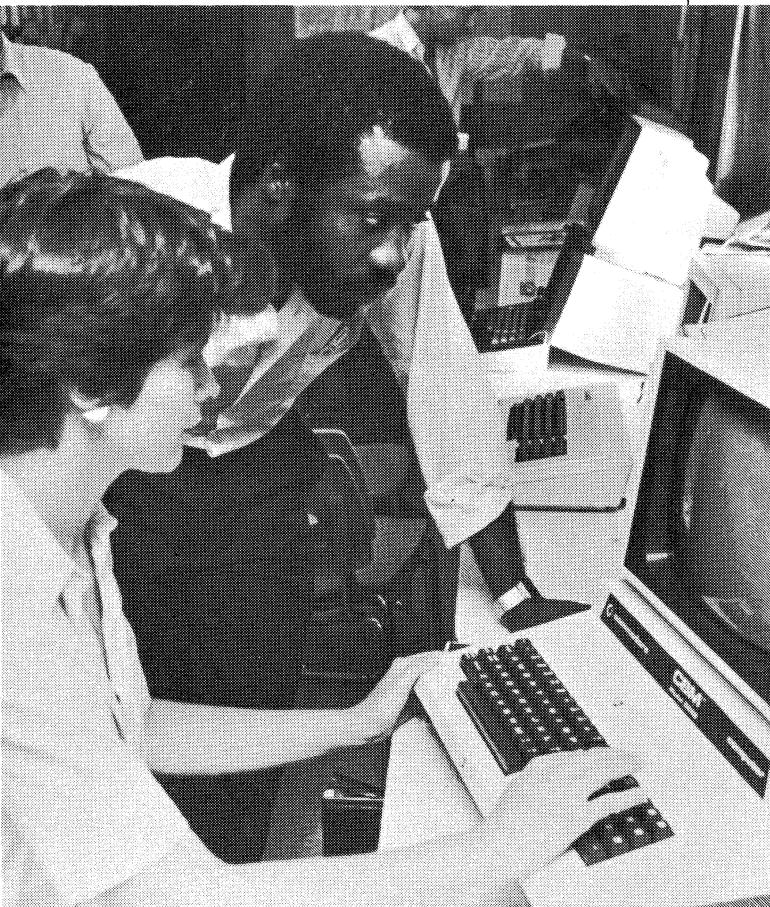
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Passing Parameters In Microsoft BASIC



By using the location pointer of a variable to represent the variable itself, it is possible to set up synthetic data structures in BASIC.

Remember, BASIC always scans from the head of the chain. The first A is not the renamed B we assumed it would find, and in fact, we can no longer access the second A, let alone rename it back to B, unless something happens to that first A; VARPTR will always stop at the first A encountered.

Knowing that BASIC always scans from the head of the chain when accessing variables, leads to an important observation: define your most used variables first to minimize the overhead involved with scanning the variable chain.

Conclusion

So there you have it, change the name rather than the contents of a variable. Microsoft BASIC provides you with everything that you need to do this. Although this may not be that useful for integers and the like, it is a real time and memory saver if you're dealing with arrays. Regardless, it's quick, fast and most important it works, if you're careful.

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Software Review

Microcomputer Message Service for the Apple II by Michael Baker

As sleep finally ends another bleary eyed session at the computer, all concrete mental processes cease, and the abstract takes over. I'm relaxed, at peace with the world, and, eventually, in deepest, darkest sleep.

Suddenly, quite without warning, a loud noise akin to Xeonex widows wailing for their bereaved levitates my taut body to within two and a half feet of the ceiling. As I hit the mattress a second time, the widows erupt in chorus again. Sheer terror gives way to simple disorientation as I bumble across the room in attempts to locate my clone. A third audible eruption confirms the source, and a deft punch of the escape key forever silences the fool demanding to chat at three ten in the morning.

MMS, written by Michael Baker, is the third bulletin board I've used to torture defenseless disk drives. Originally the SYSOP of the ABBS based NightOwl, I decided it would be more convenient to operate a board from my house, as I'd have greater control over its content, and I'd be around should it crash. This, and Networks Canada's software and modem spawned NetCan II.

Straight from its package, MMS, an acronym for Microcomputer Message Service, consists of two disks and a manual. The manual, though thin and generally unimpressive to look at, is nonetheless informative and complete.

First time operation is simple. The master control program disk is booted and a message disk is formatted from the menu. Leaving the message disk in the drive, an introduction to the board and an optional special announcement may be keyed in, as well as message zero for the message section of your

board. From this point the fun begins.

One of the perks about MMS is a resident dictionary. Offending words that the sysop doesn't want to see blessing his CRT can be typed into the dictionary by selecting that choice from the menu. Mistakes are easily fixed using the included editor, and, should a word suddenly become acceptable, it can be removed from the dictionary at any time. As I've no visible scruples, I typed in a number of racist words. An offending user gets two warnings before his modem is left attempting to suck carrier from a dial tone.

Online, MMS displays astounding disk access time. Though the manual contains a table of access times for varied operations from one half to three seconds, seeing is believing. The only point where the program varies from these times is when message one hundred is saved. At this point, message one is deleted, messages two to ninety nine are decremented by one, and the new message is saved. This operation takes about four seconds... hardly an inconvenience.

MMS makes no claims it doesn't support. It does, however, have a number of drawbacks that potential sysops should consider.

The purchase price of MMS is three hundred and seventy five dollars. Superior Apple bulletin boards...in my opinion...such as Networks and PMS, can be bought for at least half that amount.

Privacy and security are usually a concern on bulletin boards. MMS has neither. Users answering a plethora of logon questions have to answer the same questions the next time they call. Logon answers are sent to a log file, and aren't accessed by the system again unless the sysop requests a peer at them. Devious users can log in under another user's name

and destroy whatever reputation the wronged user had built up on the board. Usually, a password is either assigned or made up by the user to prevent this. The only saving grace in this oversight is that MMS doesn't support private messages, thus unsavory characters cannot access messages in this manner that are not normally open for them to read.

Consecutive message reading on MMS is archaic at best, its syntax not unlike the early BBSs in the Seventies. 'R1,2,3,4,5' will allow the user to read messages one to five without interruption. The BBSer wanting to read twenty five messages is in for a battle with the keyboard. Users cannot get out of a message scan once they select that option. A RETURN offered at the scan prompts will cause the program to assume that the user wants to see all the message headers. One hundred message headers scrolling at three hundred baud equates approximately to a parliamentary speech.

One must not forget the bells. MMS is Quasimodo's revenge. Users selecting a forty column screen width are accosted with control-G's from the thirty fifth character typed in message or chat modes, and, unlike the sysop, have no way of turning the bells off at their end. I received complaints from practically every user on this point, as terminal programs for computers not sporting a bell often use a graphic representation of same or an inverse G. These aren't a pretty sight snuggled between letters.

Downloading is not supported on the system. As MMS will work on either one or two disk drive computers, this appears to be a necessary compromise. Note that Networks can be configured to operate on one drive and still provide a download section, though there is, admittedly, a message number trade off.

The above complaints were from users during the three weeks I had the board operational. During that period, I formulated a few of my own. The C command for chat appears to do nothing when typed by the user, so it is usually typed in multiples of three. In actuality, it produces the spine chilling bleat described earlier.

The sysop cannot type lengthy files that users can access only if they desire. A 'trading post' is provided as an optional message set, but its purpose is for revenue. An amusing message about sheared sheep just won't cut it in a trading post.

Last, and perhaps most important is the copy protection on MMS. Both the MCP and bulletin board disks are write protected as the drive appears to attempt to erase the disk before lifting the required information from the last tracks. Reset has no apparent effect, and there is no obvious way for the sysop to list or disassemble the program to make what appear to be necessary changes.

In all, for the present at least, MMS neither returns appropriate value for three hundred and seventy-five dollars, nor does any part of it constitute justification for that figure. I wouldn't go so far as to say it wasn't worth the phosphor it was printing on, but as I watched a healthy user log dwindle down to three users... well, I was discouraged.

MMS is certainly an operational piece of software, but until future releases incorporating drastic improvements and a similar price reduction are made available, it remains just that.

-John Rudzinski

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The TI Portable Professional Computer offers the same high-resolution graphics, colour capability, memory expansion up to seven hundred and sixty eight kilobytes, internal modems, and easy-to-use keyboard as the Texas Instruments Professional Computer. Because the new portable is totally compatible with the TI Professional Computer, an extensive software library and numerous hardware options are available.

All software programs available for the Texas Instruments Professional Computer, such as MS DOS, Lotus' 1-2-3, and TI's own NaturalLink access to the Dow Jones News/Retrieval Service, are compatible with the TI Portable Professional Computer. Also available for both computers is TI's Speech Command System and support for the Etherseries Local Area Network. A ten megabyte Winchester Disk option is available now for the desktop model and is scheduled to be available in the first quarter of 1984 for the new portable.

The TI Portable Professional Computer is designed for professionals and executives who need to acquire information, analyze data and communicate decisions without time and location constraints.



strains. The portable can improve productivity in a variety of jobs that require occasional computer mobility. The new portable can also enhance productivity in specific environments. With this computer, consultants can conduct on-site analyses journalists and writers can do word processing on location, and auditors can run their clients' working models on the spot.

The keyboard of the TI Portable Professional Computer attaches to the system unit, which contains the central processing unit, the video display monitor and the diskette drive. A built-in storage compartment for cable and electric cords makes the computer easy to pack, and a built-in handle makes it easy to carry.

Other features include a sixteen bit 8088 Central Processor, a minimum of sixty-four kilobytes of RAM expandable to seven hundred and sixty-eight, five expansion slots, and an integral five and one quarter inch half-height floppy diskette drive with space for an additional built-in disk drive option. Storage capacity of an individual floppy diskette is three hundred and twenty K under MS DOS 1.1 and three hundred and sixty kilobytes with MS DOS 2.1. The portable version will support all communication products currently available for the TI Professional Computer including TTY, 3270, and the Etherseries of local area network products.

The TI Portable Professional Computer features high-resolution graphics using either the monochrome or colour display. Both displays incorporate the same twenty-five line by eighty column format and a resolution of seven hundred and twenty by three hundred pixels. Application programs which make extensive use of graphics operate identically with either system. The new TI Portable Professional Computer also has the ability to drive and external twelve inch monochrome or thirteen inch colour monitor.

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Shipments to dealers will begin in January, 1984, and inquiries may be addressed to Texas Instruments, Inc., Data Systems Division, 41 Shelley Road, Richmond Hill, Ontario L4C 5C4, (416)884-9181.

inch at a repetition rate of fifteen hundred dots per second per activated needle is available.

Other key Qantex 700 family features include proportional spacing, right-hand margin justification, auto underline, overprint and bold, downloadable fonts and an expandable buffer.

The Model 7065 can store up to three letter-quality fonts on-line without requiring



Dot Matrix Printer

North Atlantic Industries has introduced a multi-mode printer that is the fastest Diablo compatible printer available today.

Already recognized as the "premier" dot matrix printer line, the Qantex printer family has now added the Model 7065 which combines all state-of-the-art features of its predecessors plus full compatibility with both Epson and Anadex escape codes. Diablo 630 compatibility, now offered in the popular Qantex 7040, is available in the 7065 as an option, at speeds of up to two hundred and fifty characters per second.

The Model 7065 operates at a high speed draft copy rate of three hundred characters a second; at two hundred and fifty cps in the compose mode; and at one hundred and twenty-five cps for near-letter quality. Letter quality output for word processing is obtained at sixty-five cps. In the graphics mode, resolution of up to one hundred and forty-four by one hundred and forty-four bit-mapped dots per square

a change of print wheels. Standard word processing fonts offered are Trend and Courier. Emphasis, Cubic, Scientific, APL, Script, Italics and others are offered as options.

When used in a data processing system, a host computer can download printer parameters to the Model 7065 using escape code sequences. The unit is escape code compatible with the DEC LA120. Escape codes allow the selection of eight different character sets; a variable forms length of one to two hundred and fifty-six lines; vertical tabs and margins; horizontal tabs and margins, and vertical pitch.

Using other escape codes, a user can select the graphics mode and print density; download character fonts; select automatic repeat, underline and bold print features; choose proportional spacing and margin justification.

The Model 7065 is controlled by a Z-80A microprocessor and contains a standard four and one half kilobyte input buffer. An in-

ternal diagnostic routine checks out the printer's systems before the operation begins. Three status and diagnostic print-outs are also provided.

As a data processing printer, the Model 7065 prints bi-directionally at either three hundred or two hundred and fifty cps using character sets of the USA, UK, Germany, France, Norway/Denmark, Sweden, Finland and Spain. Hebrew and Arabic fonts are also available.

An easy to use manual single sheet feeder incorporates a combination roller/tractor that allows use of both continuous form or cut sheet documents without requiring an additional external device to be attached to the printer. A paper tray is provided to help guide cut sheets into position for printing.

The Model 7065 is equipped with two interfaces: a Centronics parallel and an RS232 serial with current loop. Interfaces are selected by using a DIP switch. The serial interface supports STX/ETX, X-On/X-Off, Busy + and Busy -. Baud rate capability ranges from one hundred and ten to nineteen thousand two hundred bps.

Like all Qantex printers, the Model 7065 is American made and features heavy duty construction. It is rated for continuous operation. Delivery will begin March 1984 when the 7065 will be available through the Qantex network of distributors.

For further information contact North Atlantic Industries, Inc., 60 Plant Avenue, Hauppauge, N.Y. 11788, (516)582-6060.

Transportable Micro

Radio Shack introduces the TRS-80 Model 4P Computer, a transportable compact version of the Model 4 that offers the features required for full desktop computer operation. It can be used anywhere there is an AC outlet.

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resolution graphics. An internal direct-connect modem board can be added to allow communication with other computers and to access information services.

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Microsoft Disk BASIC, owner and programming manuals, reference card and an introduction to the com-

puter to get users started immediately all come with the Model 4P.

The Model 4P will be available through local Radio Shack Computer Centres.

Exploring the IBM PCjr

Digital Learning Systems Incorporated announced a diskette-based learning product for IBM. The product is entitled *Exploring The IBM PCjr* and will be included with each diskette-equipped IBM PCjr when shipments begin in the first quarter of 1984. *Exploring The IBM PCjr* introduces the first-time computer user to the PCjr's keyboard, disk drive, operating system, BASIC programming language, and printers.

Exploring The IBM PCjr is designed to be a new owner's first exposure to personal computing. The program assumes no background in computing or typing. Although it covers a great

deal of subject matter, they've tried very hard to keep it on the lighter side. Much of their testing effort was focused on finding the right blend of education and entertainment.

Exploring The IBM PCjr is organized into pages and chapters, in a metaphor of a book. The user is free to page backward and forward or skip around from chapter to chapter. Each chapter consists of one or more interactive learning environments. These environments take advantage of the PCjr's extensive colour, animation and sound capabilities.

"Exploring The IBM PCjr" is written in ATL, Digital Learning Systems' proprietary development system for educational and entertainment software.

The product is being manufactured by Digital Learning Systems, Inc., 168 East Main Street, Denville, N.J. 07834.

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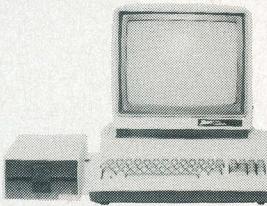
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This survey is completely confidential, and we would prefer that you do not put your name on it. If you have any additional comments that you cannot fit in the space provided, please attach a separate sheet of paper.

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A The Magazine

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Organize Your Apple			
The Gemini Within			
Electronic Office Returns			
The Macintosh Revealed			
Polish That Buffer			
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The Morse Fruit			
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2. Please rate our regular features, also on a scale of 1 to 10.

Feature	Score	Comments
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BBS Numbers		
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3. Please indicate in order of preference, a maximum of 5 articles you would like to see, with 1 being foremost. Don't use the same number twice.

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B Computers

1. What do you think of the technical level of Computing Now!?

Too low About right Too high

2. Do you own a computer? Yes No Plan to buy
If so, which: _____

3. How many K of RAM are on your system? _____

4. If you own a computer, how many people other than yourself use your computer? _____

5. Do you own:

<input type="checkbox"/> 5 1/4 inch disk drive	<input type="checkbox"/> Yes	<input type="checkbox"/> No
<input type="checkbox"/> 8 inch disk drive	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Hard disk drive	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Matrix printer	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Daisy Wheel printer	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Modem	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Expansion RAM	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please specify)	_____	

6. Software:

Spreadsheet
 Data Base
 Word Processing
 Other (Please specify) _____

7. Languages/Operating Systems:

<input type="checkbox"/> MBASIC (interpreter)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> CBASIC (compiler)	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> PASCAL	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> FORTH	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> FORTRAN	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> CP/M	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Apple DOS	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> MS DOS	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> ASM or other	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Assembler	<input type="checkbox"/>	<input type="checkbox"/>
Other (Please specify)	_____	

8. What do you use your computer for? (Check any boxes appropriate).

- Games
- Graphics
- Home Finance etc.
- Engineering
- Business Use
- Terminal
- Word Processing
- Education
- Semi business/ personal
- Self-education
- Music
- Just dabbling

Reader Survey

9. Sources of software:

- Self written Exchanged
- Commercial From magazines
- Pirated* Other (Please specify) _____
- Imported from U.S. * This is a confidential survey

10. What hardware, software or peripherals are you planning to buy in the next six months? _____

11. Please estimate the total dollars you spend on computer related materials for personal use each month? _____

12. Please estimate the total dollars you spend on computer related materials for business use each month? _____

13. Are you planning computer or computer related purchases for personal use within the next six months? Please describe: _____

14. Are you planning computer or computer related purchases for business use within the next six months? Please describe: _____

15. Do you buy from one retail outlet exclusively?

- Yes No

Do you comparison shop? Yes No

16. Name three outlets you have shopped at _____

17. Do you find Computing Now! advertisements helpful? _____

18. Do you read the Classified feature? _____

C Distribution Information

1. Do you read Computing Now! each month Yes No

2. If your subscription copy is late, please indicate the first letter of your postal code (e.g., M for M4H 1B1) _____

3. If you bought this copy at a newsstand:

- (i) Was it available at the beginning of the month?
 Yes No Don't know
- (ii) Do you find it hard locating a newsstand that sells Computing Now! Yes No

4. How many other people read your copy of Computing Now!?

- Self only 3 other people
- 1 other person 4 other people
- 2 other people More than 5 other people

5. How did you find out about Computing Now!?

- From a friend Saw it on a newsstand
- Advertisements in Electronics Today International
- Through promotional literature in the mail
- Other (please specify) _____

6. Do you subscribe to Electronics Today? Yes No

7. Do you buy Computing Now! or Electronics Today on newsstands? Yes No

If yes, at: newsstand electronic or computer store

8. What other publications (newspapers, magazines etc.) by name do you read for computer information? _____

9. Do you purchase Moorshead Publications "Specials" as published? Yes No

If yes, please name: _____

D Reader Profile Information

Tell us whatever you want us to know.

1. Age: _____ 2. Sex: Male Female

3. Level of formal education: Community college
 High school University

4. Profession: Managerial
 Professional Self Employed
 Technical Other _____

5. Do you own any credit cards?

- Visa Mastercharge American Express Other

6. What is your approximate annual income? _____

7. Please rate Computing Now! against other magazines from 1 to 100, with Computing Now! being an arbitrary 50.

	never seen it	never read	used to read	often read	regularly read	rating
Computing Now!						50
Microcomputing						
Byte						
Infoage						
Computing and Electronics						
Popular Computing						
Practical Computing						
Micro 80						
InCider						
PC Word						
Info World						
Compute						
PC						
Creative Computing						
Electronics Today						

8. How much time do you spend reading Computing Now! each month?

- 15-30 minutes 30-60 minutes 1-2 hours more

9. How long do you keep your copy of Computing Now!? _____

10. What suggestions do you have for improving Computing Now!? (Kindly use separate page)

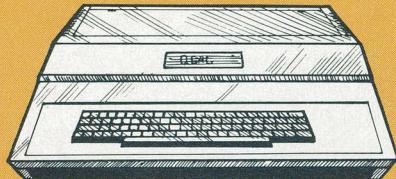
11. What do you like about Computing Now!? (Kindly use separate page)

12. What do you dislike about Computing Now!? (Kindly use separate page)

13. Have you got a question you would like in the HELP Column? Please give initials and a city/town. (Kindly use separate page)



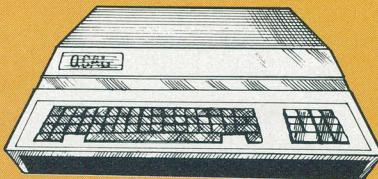
international



QCAL 500

- 64K RAM
- RAM expandable to 194K byte
- Cassette interface
- 8 expansion slots
- CSA approved power supply
- Games I/O complete with extention

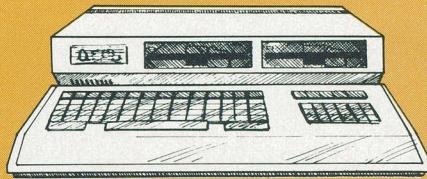
\$549.00



QCAL 900

- Dual processor 6502 & Z-80
- Z-80 microprocessor designed keyboard
- 94 function keys
- Auto repeat
- CSA approved power supply
- 8 expansion slots

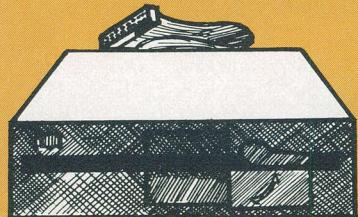
\$699.00



QCAL 1000

- 6502 & Z-80 dual processors
- detachable keyboard
- 188 function keys
- 10 user defined keys
- memory retention of 5 years
- Auto repeat
- Auto line number
- CSA approved power supply
- Dual disk drive & controller add \$650.00

\$849.00



*LASER SLIM LINE TEAC FD55A MECHANISM

Access time track to track 6M.SEC
Storage capacity 40 tracks 163K bytes

Controller \$69.00

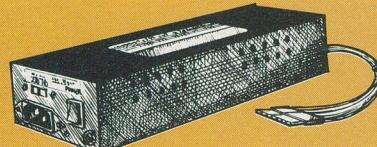
\$309.00



TAITRON MODEM II

- Auto answer
- Auto dial
- 340 baud
- Firm ware in EPROM
- Half or full duplex
- Install in slot #1 to 7

\$299.00



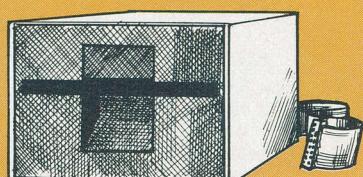
QCAL POWER SUPPLY



Heavy Duty Switching
Power Supply

CSA Approved
90 day warranty

\$89.00



*LASER FULL HEIGHT SHUGART SA-370 MECHANISM

Access time track to track 14M.SEC
Storage capacity 40 tracks 163K bytes

Controller \$69.00

\$299.00

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The story behind moveable micros.



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